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ABBREVIATIONS

The following are used throughout *Petroleum Review*:

mn = million (10 ⁶)	kW = kilowatts (10 ³)
bn = billion (10 ⁹)	MW = megawatts (10 ⁶)
tn = trillion (10 ¹²)	GW = gigawatts (10 ⁹)
cf = cubic feet	kWh = kilowatt hour
cm = cubic metres	km = kilometre
boe = barrels of oil	sq km = square kilometres
equivalent	b/d = barrels/day
ty = tonnes/year	t/d = tonnes/day

No single letter abbreviations are used.

Abbreviations go together eg. 100mn cty = 100 million cubic feet per year.

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Front cover: The Hull East terminal, Hull operated by United storage.

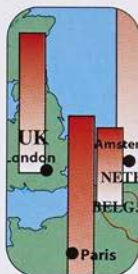
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ROUNDUP

From the Editor

Spare a thought for Opec

Historically, sympathy for the Opec producers has been fairly limited among the main oil consuming nations. The memories of being on the receiving end of sharp price hikes and the behaviour induced by massive financial transfers have left deep scars. However, the reality is that most Opec countries are now poor and getting poorer.

Since their financial high point in 1980/81 the Opec producers have seen revenues falling and populations soaring. As Dr Salameh shows in his article on p38 these trends, plus heavy military expenditure, have taken their toll. Average per capita income in Saudi Arabia is now on a par with Latvia.

Those with access to screen services (members and paying visitors can use the one in the IP Library) will have noted that in the 1Q1998 the Opec basket of crudes averaged \$13.35/b, down a massive \$7.32 on the year earlier quarter. By the second quarter the Opec basket averaged just \$12.45; or \$5.38 below the second quarter last year. Opec revenues in 1H1998 are around \$64bn lower than in the 1H1997.

Even with the most conservative planning assumptions the Opec countries have 'lost' \$20bn-\$30bn that they had budgeted to spend this year. National budgets respond only slowly to revenue shortfalls so there are many more cutbacks and projects to be cancelled in the Opec countries.

However, the other side of the coin is that the world's importers are at least \$20bn-\$30bn better off than they might reasonably have expected to be. This sudden cash windfall to countries and companies may help to explain why crude and product stocks have soared to record levels in every location from the Caribbean to the Philippines.

Crude at two-thirds of last year's price means the money tied up in stocks is proportionally lower, which in turn allows companies to profitably stock against smaller contangos.

Storage operators who only a few months ago were bemoaning their fate and talking mergers are now enjoying full terminals and regretting they don't have more capacity to sell.

Our annual bulk storage survey (see pp20-37) shows that the European scene is stable with little or no capacity additions and few changes of ownership. The excitement caused by the proposed merger of Royal Pakhoed (Paktank) and Van Ommeren rapidly waned when it became clear that the

European Commission required major site sales if the merger was to go through. This proved too high a price and the merger was called off.

The International Energy Agency's (IEA) latest report offers Opec and other producers scant encouragement. Although the IEA is still predicting an overall oil demand growth of 1.1mn b/d for 1998 over 1997 the estimate has been steadily revised down as the full impact of the Asian crisis manifests itself.

The IEA foresees a 300,000 b/d shortfall in non-Opec production in the 3Q1998 and 4Q1998 as a result of project delays (some, such as in Norway, are intentional, while others are not). Any cheer this may give Opec is probably offset by the fact that recent Russian exports at 3.1mn b/d are running at all-time record levels.

The latest edition of Petroconsultants' *World Petroleum Trends* report, however, hints at much better times for Opec in the medium term. According to Petroconsultants over the last five years worldwide discovery (outside the US) averaged just 6.29bn b/y compared with consumption of over 20bn b/y. Just one country - Angola - accounted for 15% of discoveries over the last five years and no less than 45% of 1997 discoveries. Of the top 10 non-Opec producers (excluding North America and CIS) only Angola and Brazil more than replaced reserves in the last five years with all the others replacing less than a third of their production in the period.

Our survey of the deepwater Gulf of Mexico projects (p40) clearly shows what can be achieved by the industry in an environment of low tax and minimal political risk close to major markets able to absorb all new production flows.

The downside is the small size of the accumulations found to date - the largest Gulf of Mexico field to date, Mars, has reserves one-third the size of those in Brent.

The conclusion is straightforward - if the conditions are economically favourable and the owner can be sure of receiving the reward from investments, then really quite small accumulations can be developed. The converse is equally true - if there is political and fiscal uncertainty only the largest finds can be developed. This in turn means that raising tax take reduces developable reserves while lowering taxes expands the reserves base that can be developed. Perhaps the UK government should take note.

Chris Skrebowski

Web World

Most of us recognise the value of the Internet as a valuable business tool, but actually getting connected in the first place can be rather complicated if you don't know where to start.

First you will need a PC that is capable of taking you into cyberspace. For an enjoyable surf, ideally you should have a pentium processor, 16 Mb of RAM (more RAM will make your applications run faster) and a modem, preferably no slower than 28.8 kbps (this is the rate at which it transfers information). The 56.6 kbps modems, although more expensive, offer access speeds only slightly below ISDN (64 kbps) and will reduce your telephone bill as data will download faster.

Next you need an Internet Service Provider (ISP). These companies supply your e-mail address and the software you need in order to view web pages. There are well over 100 of these companies, so choosing the right one can be difficult.

Internet Magazine, a monthly publication available from newsgroups, publishes a list of ISPs and ranks them according to quality of service.

Also, you may have received free trial software through the post for some ISPs. Many of these are easy to set up and offer you the opportunity to try before you buy.

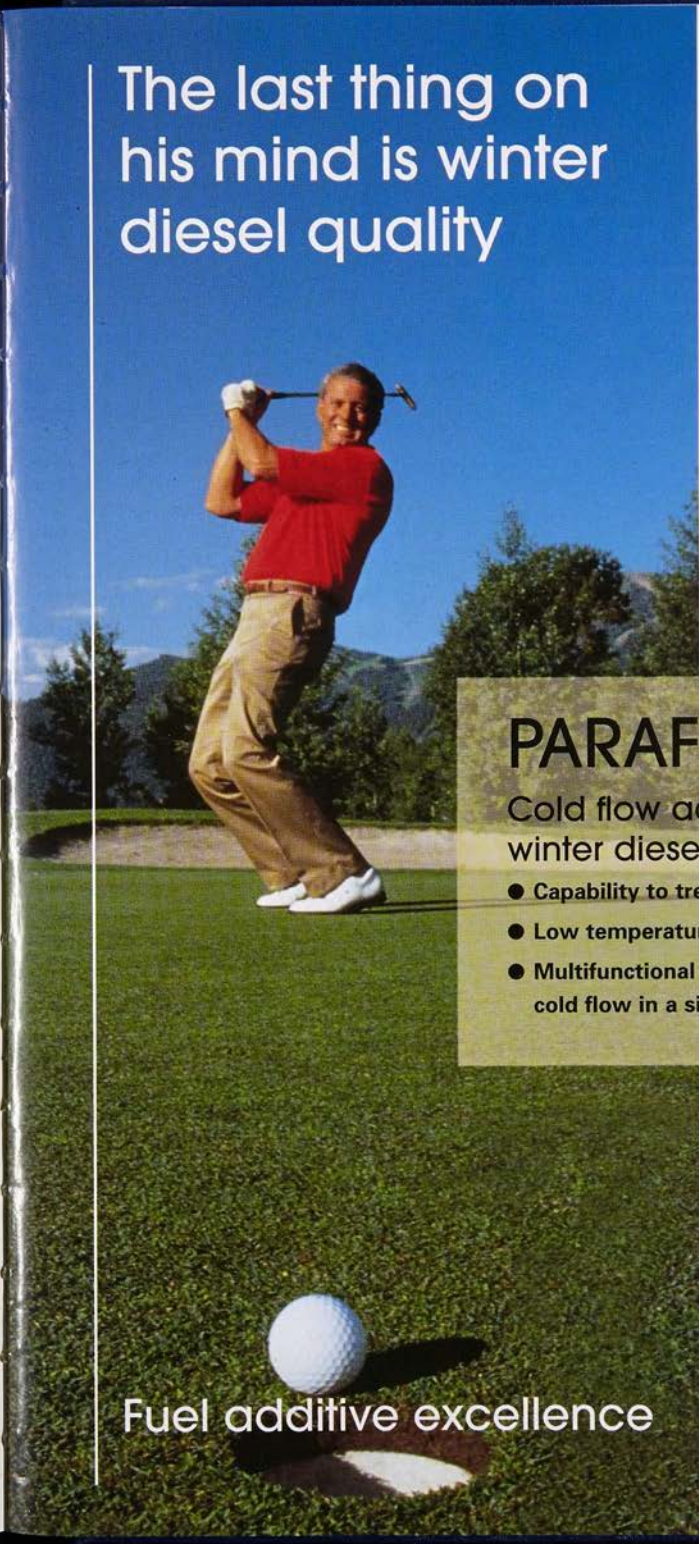
Before making your decision, you need to think about your individual needs; for example how many e-mail addresses are required - some ISPs offer just one, while others will let you have five or more. You may well decide at some point to promote your business on the Web, so it is worth choosing a provider that will give you some web space. This tends to range from 2 Mb to 25 Mb, and sometimes business use is not permitted.

If you are looking to have a graphics-rich site with a large number of pages, it is no good settling for the minimum. Also, some ISPs do not support modem speeds above 33.6 kbps, so you should check before subscribing.

Once you're connected, why not start with the IP's own website? Just type www.petroleum.co.uk in the address window and you will be transported to a wealth of information on the oil and gas industry.

If you have any questions regarding the IP website or the Internet in general, please contact Catherine Pope via e-mail - cpope@petroleum.co.uk - or tel +44 (0)171 467 7112.

● Last month it was incorrectly stated that the Deepwater site (www.deepwater.co.uk) contains a database of onshore platforms. This should have read 'offshore platforms'. Our apologies for the mistake.



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Kazakh oil to remain under state control

While 80% of Kazakhstan's oil producing companies are already privatised, Kazakhstan will remain firmly under state control, Kazakh Foreign Minister Kassymzhomart Tokaev asserted at a press briefing in London in late June. However, he stated that the government remained committed to privatisation in general and was keen to encourage further western participation in the country as part of its economic policy to liberalise and open doors to the outside world. Kazakhstan has attracted around \$8bn of foreign investment over the past six years, he said.

Tokaev also reported that the Russian

President Boris Yeltsin was to meet with leaders from Central Asia and China in the Kazakh capital of Almaty at the end of June to discuss the demarcation of regional borders and oil development plans, including an agreement covering the division of the seabed in the northern part of the Caspian Sea.

He also said that Kazakhstan and China are expected to sign a separate agreement demarcating their common borders in the near future.

Kazakhstan's oil swap arrangements with Iran, covering 2mn t/y, are also expected to resume shortly, Tokaev reported.

Enterprise Oil sells North Sea assets to Intrepid

Enterprise Oil is to sell its wholly owned subsidiaries Enterprise Oil Production and Enterprise Oil Transportation to Intrepid Energy North Sea for £264mn. Included in the deal are Enterprise's entire interests in the UKCS Piper, Claymore, Saltire and Scapa fields, together with associated infrastructure and certain exploration acreage. Also included is a 5.7% stake in the Nelson field.

The sale will result in a post-tax profit on disposal of approximately £35mn in 1998 and is expected to enhance future earnings at current oil prices, states Enterprise. The field interests being sold represent 3% of Enterprise's reserves base, accounting for around 37mn boe of net reserves at 1 January 1998. The interests produced 25,700 boe/d net to the company in 1997.

EuroGas secures Ukrainian first

EuroGas has entered into two separate agreements to develop coalbed methane gas projects in the Ukraine. Under the first, it has formed Eurodongas, a 50:50 joint venture company with private Ukrainian company Makysiv'ske Girs'ke Tovaryststvo (MGT), to explore and develop CBM in the Donez coal basin in eastern Ukraine. Gas reserves are estimated to be in the region of 400bn cm. Three 1000-metre wells are currently planned to be drilled.

It is believed to be the first time that a non-Ukrainian company has been incorporated into a joint venture to explore and develop the country's substantial

CBM gas reserves.

The second agreement, reached with state-owned geological company Zahidukrgeologia, covers licence 770 in the Lviv-Volyn coal basin in the southwest of the country. EuroGas is to drill three CBM gas wells to depths of 400 to 500 metres, beginning in August 1998. Reserves are estimated at more than 10bn cm.

EuroGas also intends to drill two natural gas wells in Ortynitske and Kameniske in the western part of the Ukraine in September 1998. Reserves potential for the two areas is put at 7.3bn cm of natural gas.

Uplifting North Sea first for Tern field

A production well in the Shell Expro-operated Tern field is claimed to have become the first to start producing in the North Sea with a dual electrical submersible pump (ESP)/gas lift completion.

Increasing gas lift demands and a lack of pressure support in some areas of the reservoir (which came onstream in 1989) led to a review of the platform's artificial lift capabilities. A dual artificial lift strategy – gas lift

complemented by ESP systems where appropriate – was adopted.

Although the Centrifugal ESP system will provide for the well's full artificial lift requirement, the utilisation of dual artificial lift completion is said to give the operator the capability to extend production between workovers and add flexibility on workover planning.

The TA25 ESP system is expected to produce up to 14,000 b/d during its first year of operation.

In Brief

United Kingdom

Shell UK and Esso Exploration and Production UK have acquired Murphy Petroleum's 7% interest in North Sea block 30/2a. In exchange, Murphy has acquired the two companies' 100% equity in blocks 30/21 and 29/20a.

Marathon Oil UK has increased its acreage holding in the central North Sea around Brae by 30% through the acquisition of both TOTAL's 12% stake and Amerada Hess' 18% interest in block 16/3d. The latter transaction also includes the exchange of Marathon's 3% non-operated interest in block 28.5a.

Deminex UK Oil and Gas is to acquire Texaco North Sea's 100% interest in North Sea licence P021 (blocks 21/23a, 21/24 and 21/29a), including Texaco's stake in the Guillemot West and North West fields.

First oil from Talisman's Ross field in the UK North Sea has been delayed for three months and is now not expected onstream until January 1999.

Sibir Energy is looking to sell its UK onshore and offshore oil and gas interests in order to finance the development of its Russian operations, particularly the oil and gas reserves of Ugraneft in Palyanokoye and Kammenoye in Western Siberia.

Europe

Halliburton has been awarded the contract to provide Phillips Petroleum Norway with zonal installation and pumping services for the entire Ekofisk field area in the North Sea.

Kvaerner is reported to have secured a Nkr470mn contract to modify the Heidrun oil platform in order to increase its water injection capacity. The platform is also to be adapted for gas exports via the Åsgard transport system and for hook-up to satellites in the Nordflanke development.

Coparex International has acquired Elf Aquitaine's 50% stake in the Les Arbousiers and Les Pins concessions in the Courbey field as well as the French company's 50% interests in the Lege and La Brousteyre exploration permits.

It is reported that the discovery well on the Q-4 block in the Danish sector of the North Sea has tested at 27mn cfd of gas.

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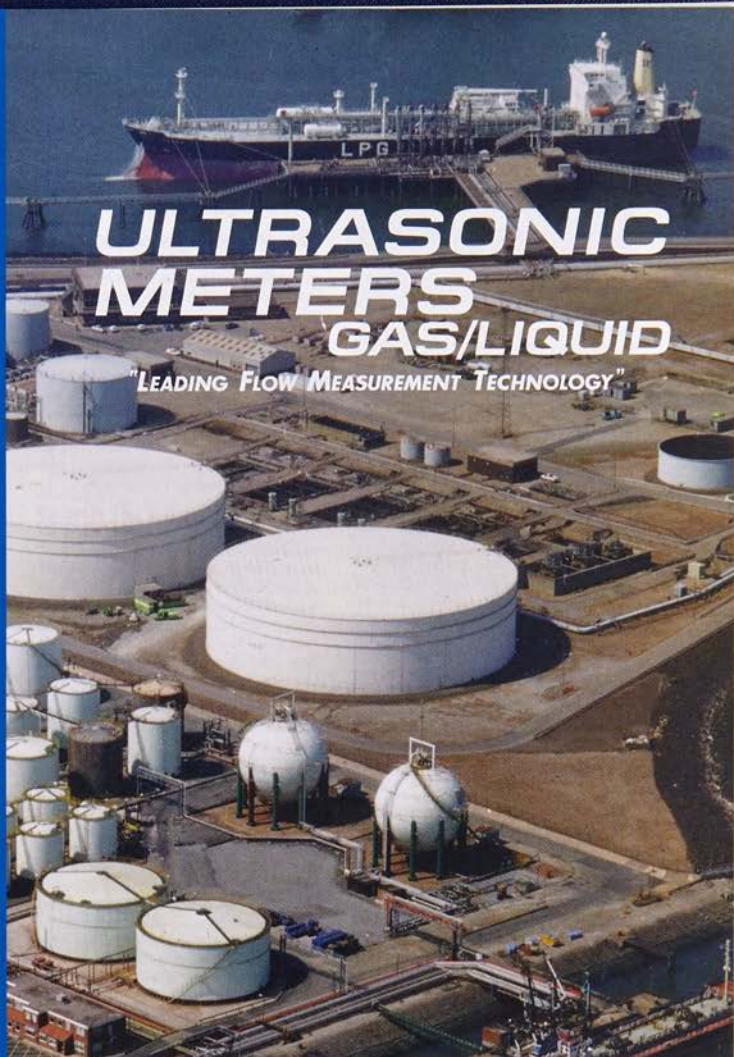
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UK oil production on the up again

New oil fields coming onstream over the past year have reversed the downward trend in UK oil production, according to the latest Royal Bank of Scotland Oil and Gas Index. Year-on-year output in May was more than 6%, or 140,000 b/d higher, than in May 1997 as the output from new

fields more than compensated for the drop in production from existing fields.

The Royal Bank of Scotland also reports that Opec's decision (p9) to cut production will have little short-term effect on oil prices which are expected to remain subdued over the next few months.

Year Month	Oil production (av. b/d)	Gas production (av. mn cfd)	Av. oil price (\$/b)
May 1997	2,285,537	7,093	19.25
Jun 1997	2,156,115	6,515	17.70
Jul 1997	2,458,846	6,018	18.41
Aug 1997	2,428,302	5,883	18.38
Sep 1997	2,526,529	6,376	18.49
Oct 1997	2,619,632	8,249	19.89
Nov 1997	2,553,987	10,075	19.07
Dec 1997	2,704,516	10,950	17.38
Jan 1998	2,590,822	11,034	15.20
Feb 1998	2,576,522	10,327	14.07
Mar 1998	2,585,659	9,823	13.17
Apr 1998	2,565,507	9,210	13.53
May 1998	2,425,220	6,636	14.40

Source: The Royal Bank of Scotland Oil and Gas Index

North Sea oil and gas production

Second report on Brent Spar decommissioning

The second report of the Scientific Group on Decommissioning Offshore Structures has concluded that the environmental impacts of Shell's plans to dispose of the Brent Spar by using parts of the structure as a quay extension at Mekjarvik in Norway are 'acceptably small'.

The report also states that there is little to choose between this option and Shell's original plan to abandon the structure in the deep waters of the north Atlantic in terms of environmental impact. However, no attempt had been made to assess the public acceptability of the proposals. It was also pointed out that while the original deep sea option 'may cost less, may be more technically feasible and carry smaller risks to the workforce, the Wood-GMC option fits more closely with the waste hierarchy (reuse, recycle, dispose)'.

Professor John Shepherd, Director of Southampton Oceanography Centre and

Chairman of the Scientific Group noted that the findings in the report are based on information available at the time of the Group's assessment earlier this year. As a result, there are 'a number of points of detail which need clarifying'. These include more detailed engineering design studies outlining the precise cutting operations. It also needs to be made clear what safety precautions, and pollution and monitoring controls will be put in place.

Stating that the Scientific Group's independent review 'broadly endorses our findings and our dialogue approach to seeking a wide range of views', Eric Faulds, Shell Expro Decommissioning Manager, said that he hoped that 'in due course the UK Government will be in a position to grant approval for the Wood-GMC proposal in time for work on dismantling the Spar to proceed later this summer'.

Green light for Cantarell project

Pemex has given a joint venture between Brown & Root Energy Services, Corporacion Mexicana de Mantenimiento Integral and Bufete Industrial the go-ahead to proceed with the development of the Cantarell EPC-22 project in the Bay of Campeche, Mexico.

The project is valued at \$520mn and involves one production platform, two

gas compression platforms and related facilities. It is said to be the largest EPC offshore contract awarded for the Cantarell expansion programme to date. Work is scheduled for completion in 2000.

The Cantarell complex is one of Pemex's most significant producing areas and involves three major oil fields: Akal, Nohoch and Chac.

In Brief

North America

Cal Dive International has signed an agreement with Chevron to provide logistical support during construction of the Spar for the Genesis development project in the Gulf of Mexico.

Husky Oil of Calgary is reported to have agreed with Talisman Energy and Gulf Canada Resources the purchase of a number of interests off the east coast of Canada including stakes in Terra Nova, North Ben Nevis, White Rose, Mara and Nautilus. The deal is valued at around \$48mn.

Middle East

Amoco has signed an exploration and production sharing agreement for blocks 15 and 44 in northern Oman.

Russia & Central Asia

Two oil and gas fields - Western Kaziyev and Skvortsovskoye - are reported to have been discovered in the Kharkiv region of east Ukraine.

It is reported that the Dzhydman oil and gas field on the northeastern shelf of Sakhalin Island is to be put out to competitive tender.

Azerbaijan is understood to have discovered a 'promising' oil and gas field on the Karabakh structure in the Azeri sector of the Caspian Sea.

The Azeri government is reported to be planning to sign a \$4bn agreement with BP to develop the Abikh oil field - recently renamed Araz - in the Caspian Sea.

Asia-Pacific

Arco has acquired a 25% interest in a major gas project in the Malaysia-Thailand Joint Development Area in the Gulf of Thailand from Triton Energy for \$150mn. Gross resources are estimated to be in excess of 10tn cf of gas equivalent.

The North Bunga Pakma field in the northwest region of block PM-3 CAA in the commercial arrangement area between Malaysia and Vietnam is reported to have flowed in excess of 100mn cfd of gas and 2,000 b/d of condensate.

Monument Oil & Gas agrees Caspian deal

Monument Oil & Gas and Socar have reached agreement on the basic principles and provisions for exploration, development and production sharing (EDPSA) on the offshore Inam block in the Azeri sector of the Caspian Sea.

The agreement entitles Monument Resources (Caspian) to 12.5% equity in the EDPSA. The remaining equity will be held by a Socar affiliated company (50%), Amoco (25%) and Central Fuel Caspian Sea (12.5%).

The deal commits the foreign partners

to acquire a 3D seismic survey over the 225 sq km block and to drill at least two wells during the initial three-year exploration period which may be extended for a further two years. If exploration is successful, the agreement calls for a 25-year development and production period which may be extended for a further five years.

Located in water depths ranging from 30 metres to 300 metres, the Inam structure is estimated by Socar to have the potential for over 1.4bn barrels of recoverable oil.

Irish Sea developments

Centrica, through its subsidiary Hydrocarbon Resources, has reached an agreement to transport and process natural gas from the east Irish Sea Millom and Dalton fields for Burlington Resources.

Subject to UK government approval, development of the Dalton field will begin early 1999 with initial gas production targeted for the 4Q1999. Development of the Millom field will commence in late 1999 with initial production planned by the end of 2000.

Search for oil continues

The Lasmo-operated North Falklands 14/13-1 well stopped drilling at a total depth of 1,550.5 metres in June. While the well penetrated potential reservoir formations it did not encounter hydrocarbons. Data from the well, together with that from the Amerada Hess well drilled earlier this year, are to be analysed for leads to further drilling locations.

The Borgny Dolphin has been released to Shell for the drilling of the first well on Tranche B.

North Sea first for free-flown ROV

Kvaerner Oilfield Products Ltd (KOPL) reports that it has successfully carried out what it claims to be the world's first free-flown ROV changeout of a subsea control module (SCM). The SCM was located on Shell Expro's North Sea Kingfisher field which lies in 120 metres of water.

Operations were carried out using the KOPL-developed Heavy Lift Module Mk11 (HLM2) with a Sub Sea Offshore Trojan (14) ROV from Transocean's semi-

submersible drilling unit John Shaw. The Shell Expro-owned HLM2 is designed to operate in depths down to 1,000 metres and is capable of retrieving components weighing up to 1,500 kg (weight in air). The unit is also capable of changing out retrievable choke inserts from both subsea trees and manifold mounted chokes.

The SCM changeout took four hours from commencement of operations to actual recovery to the drilling unit.

Norwegian North Sea knowledgebase

Geoscience consultancy Scott Pickford, based in Croydon, UK, reports that it has begun Phase 2 of the Norwegian Facies Knowledgebase (NFK). Phase 2 complements NFK Phase 1 and NFK Phase 1 Extension by extending the studies' coverage over 60-64°N on the Norwegian Continental Shelf.

NFK is a multi-client non-exclusive project which will address all released wells (and non-released by special arrangement) on the Norwegian Continental Shelf. Depositional facies interpretation of the drilled section from total depth to top Miocene is delivered to clients in a digital format compatible with the workstation appli-

cations on their desktops. Supporting data and an audit trail of the facies analysis is also available digitally. Clients are able to integrate geology and geophysics as the deliverables are referenced to both depth and two-way-time, reconciling seismic trace character directly with depositional facies.

Phase 2 will focus on the North Viking Graben to More Basin area, including 230 released wells. It is scheduled to complete by the end of 1998. NFK will help identify new acreage opportunities, model new play concepts and review stratigraphic trap possibilities generating new prospects, explains Scott Pickford.

In Brief

TOTAL reports that daily output from Thailand's offshore Bongkot natural gas field has increased from 350mn cfd of gas to 550mn cfd. Production is expected to meet around 30% of Thailand's natural gas requirements. National company PTT (40%) took over operatorship of the field from TOTAL (30%) on July 1 1998. Other partners are British Gas (20%) and Statoil (10%).

Novus Petroleum is reported to be planning to sell its interests in the Carnarvon Basin. Assets include a 40% stake in the Airline Island project producing from the Chervil field and a 12.5% interest in the Harriet field at Varanus Island. It also has exploration interests in WA149P and WA215P.

India is reported to be planning to offer 49 oil exploration blocks in its August licensing round.

Shell is reported to be planning to sell its Thai upstream oil and gas assets which are estimated to be worth \$300mn.

Soco Koryo, a majority owned subsidiary of Soco International, has signed a production sharing agreement with North Korea covering an 9,000 sq km area in the West Korean Bay Basin.

Latin America

Shell and Mobil have announced that they have been 'unable to commit' to the second phase of the Camisea project by the 15 July deadline, the end of the initial stage of the Camisea licence agreement. The two companies have invested around \$250mn in the project since signing the agreement in May 1996. It is understood that the decision was made following the failure of discussions with local authorities to settle critical issues related to the introduction of Camisea gas to the Peruvian market.

Enron Oil & Gas is reported to have made its largest discovery to date offshore Trinidad with reserves estimated to be between 600bn to 1tn cf of natural gas equivalent. The well on the Omega discovery tested at 32mn cfd and 875 bld of condensate.

Peru is understood to be planning what is claimed to be its largest-ever offshore licensing round in November or December this year. It is thought up to 13 offshore blocks, along the entire length of the country's coastline, and two onshore areas will be included in the tender.

Big oil in deep waters offshore

Over the next five years the world's oil companies are expected to increase their capital expenditure on deepwater oil and gas developments by 85%, from \$10.8bn to \$18.8bn, according to a new report from UK-based analyst Douglas-Westwood.

'As shallow water oil is increasingly depleted, deepwater reserves are becoming more important and oil companies big and small are gearing up for a major financial commitment,' explains the report's joint author John Westwood.

'Exxon Exploration, for example, holds interests in more than 300 deepwater blocks totalling approximately 20mn gross acres.'

The *World Deepwater Report* points to a number of other factors driving the increase in global deepwater activity, including:

- the greater potential for large finds compared with shallow waters;
- improved technology and management practices reducing development costs; and,
- host governments' favourable fiscal policies towards deep water.

A total of 134 oil and natural gas fields are forecast to be developed worldwide in water depths greater than 300 metres between 1998 and 2002.

Deep water is reported to account for 90% of the hydrocarbon reserves of

future fields proposed for development offshore Brazil, 89% in the Gulf of Mexico, 45% in West Africa, 38% in Norway and 9% in the UK. For these key areas 44% of the combined reserves of future fields are in deep water.

Under 3% of the world's existing offshore fields are in deep water.

Over 90% of deepwater expenditure is expected to be on fields developed using floating production systems (FPSs).

The report forecasts that a total of 58 deepwater FPSs will be required over the next five years, together with 1,296 wells and over 8,000 km of pipelines. Total capital expenditure is put at over \$71bn.

The 144-page report costs £1,850. Inclusive in this price is a year's free access to *DeepWater Online*, a new website which provides information on producing, under development and planned deepwater fields.

The service includes key information about each project, including field name, onstream date, field location, water depth, reserves, production rates, field life, development scenarios and subsea wells, as well as operator names, addresses and contact details.

For further details contact Douglas-Westwood on:

Tel: +44 (0)1227 831879

Fax: +44 (0)1227 832092

e-mail: dwadmin@douglas-westwood.co.uk

Russians and Kazakhs sign Caspian deal

Kazakhstan and Russia are reported to have signed an agreement on dividing the northern part of the Caspian sea bed which paves the way for both countries to exploit the potentially large oil resources underlying the region. However, it is expected that further disputes may yet emerge over the exact details of the

agreement which covers only the sea bed and not the sea itself. Subsequent agreements will be required for the development of pipelines and communications.

The neighbouring states of Azerbaijan, Turkmenistan and Iran have yet to sign any agreement regarding the division of the Caspian Sea.

PSA signed in western Turkmenistan

Monument Oil and Gas has signed a production sharing agreement with the Turkmen Government, state oil company Turkmenneft and Mobil covering the Garashyslyk concession onshore western Turkmenistan.

The 4,500 sq km area – which lies adjacent to the Monument-operated Nebit Dag licence acreage – includes the bulk of the remaining onshore part of the prolific Apscheron Sill. It also extends over an appreciable area to the south of the Nebit Dag licence.

The production sharing agreement, in

which Mobil (as operator), Monument and Turkmenneft will hold 52.4%, 27.6% and 20% respectively, covers the development of potentially significant reserves already discovered below the existing producing Kotur Tepe and Barsa Gelmeh fields and includes all exploration and appraisal prospects identified below and outside the boundaries of existing fields.

Initial investment will focus on comprehensive seismic programme, selected field appraisal drilling, and initiation of schemes for early production and export.

Africa

South African company Sasol, Arco and Zarara Petroleum Resources have agreed a seven-year, \$30mn offshore oil and gas exploration programme with the government of Mozambique and state oil company ENH. Exploration will focus on prospects in the M10 and Sofala blocks.

Exxon is reported to have made a third deepwater discovery offshore Angola. The Hongo well on block 15 tested at 15,900 b/d.

Stolt Comex Seaway and Bouygues Offshore ETPM have been awarded turnkey contracts worth a total of \$1.1bn from Elf Exploration Angola for a FPSO and riserflowline system for Angola's deepwater Girassol field.

TOTAL has reported a third deepwater discovery on block 14 offshore Cabinda, Angola. The Benguela well tested at a cumulative rate of more than 20,000 b/d.

Amoco and state-owned Sonatrach are to jointly develop several gas fields in the In Amenas area of southern Algeria as well as a new gas treatment plant capable of processing 19.9mn c/m of gas. Amoco expects to invest \$900mn over the life of the project. First gas production is planned in 2002.

The Ranger-operated Kiame oil field offshore Angola is reported to have come onstream at 7,000 b/d. Field reserves are estimated to be 8.5mn barrels.

BG plc reports that the Hasdrubal-4 appraisal well on the Hasdrubal gas field offshore Tunisia has flowed at 4.6mn c/d of gas and 1,800 b/d of liquids.

Burlington Resources reports that the MLSE-1 well on the Menzel Lejmat block 405 in the Berkine Basin of Algeria has tested at 14,638 b/d of hydrocarbon liquids and 107mn c/d of natural gas.

Addendum: The recently launched joint venture industry project which is developing lining systems for multi-phase flowlines – as detailed in Petroleum Review's July 1998 issue – comprises 14 members. Unfortunately, the list of members provided was incorrect. The correct listing is: Amoco, BG, BP, Durapipe S&LP, EMC, Eni Agip, Mobil, Safetyliner, Shell, Shell Chemicals, Statoil, Subterra and Wellstream.

Opec cuts production in bid to boost oil price

Opec has approved a cut of around 1.36mn b/d from its total daily output of 28.2mn b/d in a bid to boost oil prices. The cut – which includes the recently agreed 450mn b/d reduction announced by Saudi Arabia, Venezuela and non-Opec member Mexico – is in addition to the 1.245mn b/d reduction announced under the Riyadh agreement in March 1998.

Effective from 1 July 1998, the new agreement brings total reductions announced this year to 2.6mn b/d (see table). Combined with output reductions pledged by non-Opec members since March 1998, including 100,000 b/d from the Russian Federation and 50,000 b/d from Oman, more than 3.1 mn b/d of oil supply are now to be withdrawn from the market.

Opec member	Base (b/d)	Reductions (b/d)	Production (b/d)
Algeria	868,000	80,000	788,000
Indonesia	1,380,000	100,000	1,280,000
Iran	3,623,000	305,000	3,318,000
Kuwait	2,205,000	225,000	1,980,000
Libya	1,453,000	130,000	1,323,000
Nigeria	2,258,000	225,000	2,033,000
Qatar	700,000	60,000	640,000
Saudi Arabia	8,748,000	725,000	8,023,000
UAE	2,382,000	225,000	2,157,000
Venezuela	3,370,000	525,000	2,845,000
Total		2.6mn b/d	

*Note: Figures based on February 1998 production levels

Total reductions in Opec output announced in 1998 to date

Accreditation for meter proving NVQ

The Meter Proving Association (MPA) has received accreditation from the Qualifications and Curriculum Authority (QCA) for its Meter Proving Technician NVQ at Level 3.

The NVQ will be offered through the Petroleum Employers' Skill Council (PESC) as the lead body in conjunction with the MPA, and will be awarded by City & Guilds.

PESC hopes to obtain NTO (national training organisation) status shortly, after which it will be renamed PINTO (Petroleum Industry National Training Organisation).

MPA also expects the NVQ to be accredited by the Scottish Qualification Authority (SQA) in August, at which point it will be awarded as an SVQ.

The NVQ standard has a high technical and safety content, and covers all aspects of meter proving for custody transfer and fiscal metering both on- and offshore. There are specific units covering loading gantries using reference meter and volumetric vessel methods as well as units covering pipeline, aviation and offshore metering.

The standard also highlights the responsibilities and supervisory skills required by the technician and the fact that he is often a 'lone worker'.

First awards of this competency-based qualification are expected towards the end of 1998. It is anticipated that future contracts awarded for meter proving will require that personnel involved are in possession of this NVQ.

MPA is also progressing a Phase 2 project – an S/NVQ for Metering Technicians at Level 3. This will be applicable to a much wider section of industry and although initially intended for metering technicians in the onshore and offshore oil and gas industry it will have an application in other areas such as the water, petrochemicals, brewing and steel industries.

The introduction of Phase 2 has widened the scope of operation for the MPA and led to an increase in membership which now includes oil companies and instrument manufacturing companies as well as all principal contractors providing meter proving services, and metering system suppliers.

United Kingdom

Stolt-Nielsen has announced a 2Q1998 net income of \$30.7mn on net operating revenue of \$455.9mn.

Odebrecht-SLP Engineering has acquired ABB Lummus Global Oil and Gas' UK business. ABB's subsea activities are excluded from the deal.

UK offshore logistics company ASCO Group and Faroese shipyard Torshavnar Shipping are to jointly develop a supply base in the Faroe Islands.

Europe

Occidental Petroleum has agreed to sell the stock of Occidental Netherlands to a subsidiary of TransCanada Pipelines for \$275mn plus future contingent payments. Occidental Netherlands owns interests in eight gas-producing licences in the Dutch sector of the North Sea and a 38.6% stake in Noordgastransport which owns the gas pipeline system that services the area.

Italy's fourth offer of Eni shares is reported to have been over subscribed by two and a half times.

Atlantic Power has reached agreement with Norwegian-based Petroleum Geo Services to merge with the PGS Group in a deal valued at £63mn.

Norsk Hydro is reported to have sold a 10.7% stake in Saga Petroleum to Statoil and Hafslund for Nkr1.84bn. The company has retained 2.7mn shares held by its pension fund which represent around 2% of Saga equity.

North America

Wood Group Engineering (WGE) has formed a new company with Alaska Petroleum Contractors (APC). Based at BP's Milne Point Asset in Alaska, APC-Wood LLC will provide managed maintenance services.

Aviva Petroleum is understood to have agreed a merger with Garnet Resources that will complete in the 3Q1998. The two oil companies share interests in a number of Colombian projects.

Arco is to tender its 80mn shares of Arco Chemical Company stock to Lyondell Petrochemical Company for \$57.75 per share. The deal will provide Arco with an after-tax gain of \$1.3bn.

Tax rise danger for UK supply companies

Cambridge-based Public and Corporate Economic Consultants (PACEC) recently carried out a survey of 100 UK companies supplying goods and services to the oil and gas operators and their main contractors. The aim was to gauge their levels of dependency on UK oil and gas activity and the likely impact of any downturn in such economic activity. Some industry observers have voiced fears that supply companies could be crippled by a rise in North Sea taxes which may result following the UK government's review of the North Sea fiscal regime.

The study shows that a 50% fall in sales to the oil and gas industry by supplier companies would lead to nearly a third of the latter going out of business or cutting their workforce by as much as 75%. A 20% drop in sales would lead to over 40% of UK supplier companies reducing employment levels while a 10% fall would lead to a fifth of them cutting jobs. The construction, transport and communications sectors would be the worst hit as they make the most significant portion of their sales to the oil and gas industry, states the report.

Post-graduate courses in the pipeline

The University of East London has established new post-graduate courses in Pipeline Technology and Management.

The courses are specifically tailored for graduates, engineers and scientists who wish to broaden their knowledge and expertise in the pipeline field for water supply and sewerage.

Offered in modular format, and designed to be taken while remaining in

full-time employment, the courses are soon to be extended to cover oil, gas and other pipelines.

Each module is one week of concentrated full-time study. Students can take them as stand-alone CPD subjects, or can obtain a Post-graduate Certificate, a Post-graduate Diploma or an MSc degree, depending upon the number of modules successfully passed.

Partners to dissolve Deminex JV

German oil and gas companies RWE-DEA, Veba Oel and Wintershall have signed an agreement in principle which will terminate their Deminex joint venture. Each is to assume direct responsibility for a share of the crude oil and natural gas exploration and production activities of the dissolved company, integrating them into their own E&P activities in a bid to strengthen their economic viability and respective competitive positions in the international marketplace. Veba Oel holds 63% of Deminex shares, RWE-DEA and Wintershall holding 18.5% each.

Veba is to take over the Deminex subsidiaries and their staff in the UK, Indonesia, Syria, Canada, Colombia and Trinidad while RWE-DEA will be in charge of directing the operations of the Deminex businesses in Egypt and Norway (with Veba remaining a minority shareholder in both ventures). The Deminex subsidiary in Argentina and the local companies in Russia and Azerbaijan will be transferred to Wintershall. RWE-DEA has also agreed to transfer its E&P activities in the Netherlands to the Veba Group.

Russian oil excise tax muddle but Lukoil cuts costs

The Russian Duma approved a 55% reduction in the excise tax on oil, from the current average of Rb 55/t (\$1.23/b) to Rb 25/t (\$0.56/b), only to have the cut vetoed by President Yeltsin, according to recent editions of United Financial Group's *Russia Morning Comment*.

It was also reported that the Russian Government planned to ask the Duma to approve the raising of excise tax on high-octane gasoline by 21.6% to Rb 450/t. It is understood that a new draft law would be submitted that would shift the burden of this tax from refineries to service station owners.

Meanwhile, Lukoil is reported to have reduced its production costs by nearly

20%, from Rb 340/t to Rb 270/t. According to Vice President Arnold Fedun, the company can continue to profitably export with crude prices as low as \$10/b.

At current prices, direct production costs of Rb 270/t translate into \$5.98/b which, combined with transport costs of around \$3.40/b, imply total costs of \$9.40/b.

He also commented that the company's output and production costs have continued to fall while maintenance has improved and unprofitable wells have been closed – a trend that has been helped by lower transport tariffs and port costs.

Schlumberger is reported to have acquired pump and drill bit supplier Camco for \$3.3bn.

Middle East

Iran is reported to have unveiled plans to open 43 projects worth over \$5bn to foreign investors (see p44).

Russia & Central Asia

The World Bank and International Monetary Fund have agreed an aid package worth in excess of \$17bn to help Russia out of its current financial difficulties, reports United Financial Group's Russia Morning Comment. The country has now secured loans to the value of \$22.6bn through to the end of 1999, \$14bn of which will be made available during 1998.

It is understood that Russia is to delay the auctioning of a controlling 75% interest in Rosneft until late October 1998.

Turkmenistan is reported to have established a new oil company to handle licensing and production sharing discussions with foreign businesses.

According to the United Financial Group's Russia Morning Comment the Russian government is shortly to tender a 19.68% stake in Slavneft. The first auction failed last year when no bids were received for the high starting price of \$242mn plus an additional investment commitment of \$70mn and \$19.4mn to pay back taxes.

Gazprom is seeking a listing on the New York Stock Exchange, according to the United Financial Group's Russia Morning Comment.

Asia-Pacific

It is reported that China plans to double its gas production capacity to 30bn cm by 2005. Around 1tn cm of additional gas reserves are expected to be verified by the turn of the century.

Africa

Norsk Hydro and Angolan company Sonangol UEE have announced plans to form a strategic alliance to develop Angola's petroleum industry.

IFP cleans up in Greek refining sector

The Institute Français du Pétrole (IFP) has secured all the contracts for projects to adapt Greek refining capacity to new European sulfur and benzene content fuel specifications. IFP is to convert Motor Oil Hellas' (MOH) conventional catalytic reforming unit, of which it is the process licensor, to a reforming unit with continuous catalyst regeneration.

MOH has also chosen IFP's 'Benfree' technology to reduce benzene content in gasoline. MOH is also a licensee of the

'Prime G' hydrotreatment process to reduce sulfur content in FCC gasoline heavy cuts.

Meanwhile, Hellenic Petroleum has chosen IFP to remodel its mild hydrocracking and hydrosulfurisation unit upstream of the FCC. This unit's capacity will be increased by 50% and the cracking severity adapted to the production of low-sulfur FCC gasoline. Hellenic Petroleum has also chosen IFP's hydrotreatment process to lower the benzene content of gasoline.

Argentina-Uruguay pipeline consortium

An international consortium comprising BG plc, Pan American Energy of Argentina and Uruguayan state energy company Ancap has been chosen to construct and operate a 215-km pipeline linking Buenos Aires in Argentina to Montevideo in Uruguay. BG will act as operator of the \$135mn pipeline which will carry nearly 20mn cm³/d of natural gas supplied from basins in Argentina to markets in Uruguay and southern Brazil.

The consortium is also currently devel-

oping detailed engineering studies for extending the pipeline by adding a branch from the River Plate crossing for a further 920 km to Porto Alegre in southern Brazil.

Construction of the main pipeline is expected to begin later this year and it is due to be commissioned by the end of 1999. Construction of the extension to Brazil could begin as soon as authorisation is granted by the Brazilian Agencia Nacional do Petróleo.

European fuel specifications agreed

A closed meeting of a EU 'conciliation' committee has finalised transport fuel specifications for 2000 (see p14). The meeting was called following the failure of the European Parliament and Council of Ministers to agree on specifications earlier this year. The European Parliament was in favour of tougher specifications for future transport fuels quality than the common position agreed by the Council of Ministers in June 1997.

The conciliation committee also agreed mandatory limits for sulfur and aromatics in gasoline and sulfur in diesel. However, standards for 2005 have yet to be fixed and are to be drawn up as part of a second phase to the Auto-Oil programme.

EU member states can request a maximum three-year exemption from the 2000 and 2005 specifications. Also, while

	2000	2005
Gasoline		
Benzene (%)	1	—
Aromatics (%)	42	35
Olefins (%)	18	—
Sulfur (ppm)	150	50
Oxygen (%)	2.3	—
Diesel		
Cetane number	51	—
Density (kg/m ³)	845	—
Polyaromatics (%)	11	—
Sulfur (ppm)	350	50

Source: Wood Mackenzie

European fuel specifications

lead gasoline will be banned from 2000, derogations will be available up to 2005.

The proposals are scheduled to be ratified within the next six weeks.

BP and Safeway roll-out forecourt store concept

BP and Safeway have announced the roll-out of their 'mini-supermarket and forecourt' concept, which will create 2,000 jobs on 100 sites across the UK over the next three to four years.

The move — which follows successful trials in seven towns — will be jointly funded by the two companies. The new outlets will offer over 3,000 product

lines, including a wide range of fresh fruit, vegetables, meat and dairy products, combined with fuel and other forecourt services.

The 50:50 joint venture will spend around £100mn developing the sites. The new outlets are expected to generate sales of £700mn per annum when the roll-out is complete.

United Kingdom

UK fuels distributor Wincanton Logistics has invested £2.75mn in new vehicles to service its Texaco contract under which 70 vehicles carry some 2.8bn lly of petroleum in the UK.

Elf Oil UK, which operates around 500 service stations in the UK, has signed a seven-year contract outsourcing responsibility for some of its accounting functions to the Business Process Outsourcing division of PricewaterhouseCoopers.

Centrica has renegotiated a second 'take or pay' gas contract with TOTAL Oil Marine. In return for a compensation payment from Centrica, prices will be reduced to market levels on around 500mn therms of gas.

Chevron is reported to have signed a deal allowing Alliance Gas to sell Chevron's share of gas from the Britannia field on the UK spot market. The US company is unable to sell its share of gas directly on the market as it does not hold a UK shippers' licence.

According to Centrica, more than 250,000 households in the UK have signed domestic electricity supply contracts with British Gas two months ahead of the start-date for deregulation of the UK electricity market. BG's electricity offer is claimed to be, on average, 12% below current prices.

Elf Oil UK has begun retailing ultra-low sulfur diesel from its UK service station network. The fuel has 90% of its sulfur content removed during refining at Elf's Milford Haven refinery in South Wales.

Petroplus International is understood to be negotiating the purchase of Chevron's Milford Haven oil refinery.

BP has opened the UK's first service station to be equipped with solar panels. The panels will generate up to 10% of the power needed by the site which is located on the Bedford bypass.

Save Group, the largest independent fuels retailer in the UK, is understood to be the target of a takeover bid. Both Kuwait Petroleum and Shell have been reported in the press as potential buyers for the company.

Tackling distortions in UK gas market

UK gas industry watchdog Ofgas has published proposals on the way it would like to see a competitive market develop in the storage of gas. At present, BG Storage, part of BG plc which also owns Transco, the monopoly pipeline company, has an effective monopoly with storage facilities in the former Rough gas field beneath the North Sea and in underground caverns at Hornsea, East Yorkshire, as well as at five other LNG sites around the UK.

Ofgas has identified six measures in a consultation document, which involve significant changes to the regulatory regime, to remedy the effects of the market power BG Storage presently possesses. They are:

- An auction of rights to storage capacity in Rough and Hornsea on long-term contracts of five years, subject to a maximum stake by a single purchaser of 15%;
- possible additional limits on the acquisition of storage rights by British Gas Trading in such an auction, subject to security of supply considerations;
- removal of the overall revenue cap on

storage other than for LNG prior to the auction of Rough and Hornsea capacity rights;

- an end to common ownership of transportation and non-LNG storage by Transco or the introduction of a stronger business separation between the two activities;
- removal of 'top up' gas arrangements, or a modification of the current cost pass-through mechanism; and
- future LNG prices and services to be considered in the wider context of reform of transportation booking and services.

The document says that unbundling storage activities along these lines is a necessary step in securing effective competition in gas storage.

Ofgas has stated that: 'In the event that BG Storage does not accept our recommendations, or does not propose remedies of its own that Ofgas considers to be acceptable, then it is open to the Director General of Gas Supply to make references to the MMC under the Fair Trading Act 1973, the Competition Act 1980 or the Gas Act 1986'.

Reduced Aussie gas bill

A new Gas Pipeline Access Bill aiming to regulate important aspects of the gas transportation industry, in particular the setting of third party tariffs for gas transmission and distribution systems, has been passed in Australia.

Australian Petroleum Production & Exploration Association Deputy Director Peter Cochrane said: 'While gas producers are supplying natural gas at world competitive prices, pipeline tariffs have eroded much of this competitive edge. The new national access regime will deliver more competitive pipeline tariffs, and hence delivered-gas prices that are more able to compete with other energy sources.'

UK fuel prices in June

	Pence per litre
Diesel	
Lowest: Hull	64.49
Highest: Inverness	69.44
National average	66.85
Unleaded petrol	
Lowest: Hull	64.38
Highest: Dover	68.49
National average	66.02
Four-star petrol	
Lowest: Halifax	68.67
Highest: Aberystwyth	75.48
National average	72.08

Source: PHH Allstar Fuel Report

Shell UK launches auto-LP gas programme

Shell UK is to invest \$10mn developing a network of 200 auto-LP gas sites on its UK network of forecourts. By 2001, automotive LPG will be available from 200 sites nationwide, states the company.

The first new site opened on 14 July 1998 at Dover South Services in the busy ferry port of Dover. Owned and operated by independent retailer George Hammond plc, the outlet serves over half a million customers a year and is claimed to be one of the busiest service stations in the country.

A further 25 auto-LP gas sites will open on forecourts over the next five months, with a further 100 in place by the end of 1999. 'The aim is to make the fuel available to 80% of motorists by 2001 by

installing sites in major towns and cities, and at main motorway service stations', explains the company. Shell has already identified locations for the first 50 sites, but says that it would welcome input from fleet operators and local authorities on the location of the next 150. Shell states that it is the first company in the UK to invest heavily in a forecourt gas network.

Shell auto-LP gas will be sold under the new brand name MotorGas. In the most recent UK budget, duty levelled on auto-LP gas was frozen while that on diesel increased (see *Petroleum Review*, April 1998). 'Auto-LP gas is now the cheapest road fuel on the market,' says the company.

Greenenergy has announced that it is to supply Citydiesel to UK supermarket group Morrison's which will market the ultra-low sulfur fuel under its own brand name. It is the first time that Greenenergy has marketed Citydiesel under a supermarket's branding.

Europe

The EC has approved the proposed merger of Shell and Exxon's global lubricant and fuel additives businesses. The new company will trade under the name Infineum.

Mol is to supply a total of 68bn cm of natural gas to the Hungarian regional gas distribution company Tigaz until the year 2017. Tigaz is majority owned by the Italgas Snam Group.

A local Turkish group of companies is reported to have bid \$1.16bn for a 51% interest in Petrol Ofisi, Turkey's leading chain of service stations, which is being sold off as part of the country's privatisation programme.

The International Petroleum Exchange has announced plans to combine its electronic trading facilities with the Norwegian Futures and Options Clearing House's (NOS) clearing technology. The IPE-NOS link will initially focus on electricity futures. IPE does not currently have an electricity futures contract, although this is set to change with the deregulation of the UK electricity market.

It is understood that Hungarian oil and gas company Mol plans to begin retailing LPG at its service stations later this year.

North America

BP is to sell its 170,000 b/d Lima refinery in Ohio to Clark USA for \$215mn. The deal, which requires the approval of the Federal Trade Commission, is expected to be completed early in 3Q1998.

Asia-Pacific

India is reported to have abolished restrictions on crude imports by refineries. State-owned Indian Oil Corporation has held a virtual monopoly over such imports to date.

Fuel escalator raises transport costs

The increased duty on diesel announced in the March 1998 budget has had a major influence on raising goods vehicles operating costs ahead of inflation, according to a recent survey by the Freight Transport Association (FTA). Furthermore, road haulage margins are under increasing pressure as rates fail to keep pace with cost increases. According to FTA, in the year to April 1998 vehicle operating costs, including the cost of the driver, rose by up to 5.1% for a 38-tonne artic compared with a 4% rise in RPI inflation in April.

The main pressure on costs has come from two budget increases in fuel duty in the last year, which together have resulted in an 11.5% rise in fuel costs over the period, states FTA. 'Fuel now represents 20% of the cost of operating a 17-tonne gvw rigid and 28% for a 38-tonne gvw artic. This compares with 13% and 21% respectively in 1993 before the government's fuel escalator was introduced.'

The survey also indicated that basic pay settlements in the 1Q1998 averaged 3.6%. Total earnings grew at 3.9% (0.5% in real terms), reflecting increased overtime pay-

ments and bonuses associated with the relatively strong growth in the economy.

'With fuel costs representing such a high proportion of operating costs the direction of real term cost rises over the rest of 1998 remains uncertain,' comments FTA. 'In mid-June oil prices touched a 12-year low of \$12/b, reflecting continued market oversupply.'

'Production cuts of 2mn b/d, on top of the 1.5mn b/d agreed earlier in the year, are thought to be needed to bring supply and demand into balance. Such a move would force the price of crude oil towards \$18/b, representing an increase in fuel costs to the operator of 2 p/l.

'However, even if Opec was to agree to such output cuts, there remains a question over whether such an agreement would be stuck to. A further pressure on costs may come from the weakening of sterling against many European currencies.'

'Given the buoyancy of commercial vehicle registrations so far this year, this is likely to put upward pressure on import prices of commercial vehicles and spares.'

Malaysian national car manufacturer Proton is reported to be teaming up with state oil company Petronas to research and develop engines, transmissions, additives, fuels, lubricants and advanced engineering materials.

It is understood that Japanese oil company Showa Shell Sekiyu plans to close its Niigata oil refinery in northern Japan in bid to cut costs and boost company profits.

Shell and Mobil are understood to be in the final stages of discussions to merge their Australian refinery operations.

Stolthaven Asia Pacific, part of the Stolt-Nielsen group, has acquired a 24.99% interest in Dovechem Terminals Holdings in order to provide 'better integrated services and logistics solutions' to its Asia-Pacific customers. Dovechem currently operates two storage terminals in China, at Shekou and Shanghai, and has a third terminal under construction in Qingdao.

Latin America

BG plc has agreed to buy Perez Compan's 25% holding in Gas Argentino (GASA) for \$75mn which will give it a controlling interest in MetroGas, Argentina's largest gas distribution company. BG already has a 41% shareholding in GASA.

TOTAL and Distileria Argentina de Petroleo are to create a new 51:49 joint venture - TOTAL Lubricantes Argentina - which will have exclusive rights to market TOTAL brand lubricants and Banole, Citrole and Herbidown brand crop-protection products in Argentina.

Predatory petrol pricing still an issue

According to a recent report on the UK's fuels retailing sector, while gross profit margins (pump price less taxes minus the ex-refinery price) have increased from a low of 1.1 p/l in April and May 1996 to 6.7 p/l in March 1998, the threat of predatory pricing is not over.

Entitled *Motor Fuels Business in the UK: Market Shares, Supplies and Profitability*, the report also criticises the Office of Fair Trading (OFT) for using unsuitable methodology in its recent investigation of this market sector's pricing structure (see *Petroleum Review*, July 1998). It suggests that a

micro approach should have been used rather than the macro approach adopted by OFT.

The report, authored by independent consultant Gilbert Jenkins and now in its seventh edition, incorporates much statistical data - including international petrol and derv prices, UK prices compared with EEC prices, and UK petrol prices in real terms since 1912 - as well as the financial accounts of many of the UK's refining, wholesaling and retailing companies. Copies are available from Sunningdale Publications - Tel/Fax: +44 (0)1344 623955 - at a cost of £47.

UK Deliveries into Consumption (tonnes)

Products	†May 1997	*May 1998	†Jan-May 1997	*Jan-May 1998	% Change
Naphtha/LDF	129,993	239,674	729,697	1,229,126	68
ATF - Kerosene	716,418	774,952	3,182,774	3,398,623	7
Petrol	1,959,187	1,815,519	9,174,272	8,845,434	-4
of which unleaded	1,388,229	1,415,030	6,451,365	6,775,552	5
of which Super unleaded	47,844	35,349	224,595	173,975	-23
Premium unleaded	1,340,385	1,379,681	6,226,770	6,601,577	6
Burning Oil	199,538	194,251	1,590,558	1,611,672	1
Automotive Diesel	1,251,521	1,174,062	6,104,859	6,129,255	0
Gas/Diesel Oil	546,260	497,494	3,227,616	2,662,025	-18
Fuel Oil	281,606	191,343	2,053,905	1,265,893	-38
Lubricating Oil	76,339	63,318	367,885	349,798	-5
Other Products	667,307	684,247	3,506,020	3,407,865	-3
Total above	5,828,169	5,634,860	29,937,586	29,265,729	-2
Refinery Consumption	511,759	551,441	2,680,693	2,674,595	0
Total all products	6,339,928	6,186,301	32,618,279	31,940,324	-2

† Revised with adjustments *preliminary

Legal and technical – Autotrends '98

Paramins' biennial Autotrends presentation has just completed a tour of ten major European centres. It gave an overview of current legislative and automotive developments and called for more cross-industry collaboration and an increased vigilance to spot distant trends earlier. The following is a slightly shortened version of the article which appeared in the most recent *Paramins Post*.

Legislation on fuels and emissions forms the essential regulatory framework of the oil and automotive industries. Autotrends '98 looked at legislative developments in these areas and reviewed the implications for current technologies.

The initial reference point in the presentations was the Kyoto conference which took place at the end of 1997. The EU took a proactive line on the reduction of greenhouse gases and has applied the same approach over carbon dioxide emissions from motor vehicles. Voluntary limits were considered inadequate so binding reduction goals were urged.

As a result, the EU stance is considerably changed. Laws on passenger car emissions and fuel quality for the year 2000 have been almost agreed. But in the case of the sulfur content of diesel fuel there is still a significant gap between the Council of Ministers' proposal for 350 ppm max and the European Parliament's demand for 200 ppm max (see *Petroleum Review*, May 1998. See also p11 which outlines the most recent developments). Aromatics in gasoline also still represent a contentious area.

Even before Auto Oil 1 takes effect, the industry has started preliminary work on Auto Oil 2 to research the basis for legislative decisions due in 2005. There are strong differences of opinion about the objectives, function and timescale of Auto Oil 2. Legislative proposals must be complete by June 1999, which means that all the data have to be collected by the 3Q1998.

The likely outcome is a classic compromise. To suit the European Parliament, 2005 emissions and fuel

quality limits will be probably mandated now, but for the European Council the compulsory review will come later, some time after 2000.

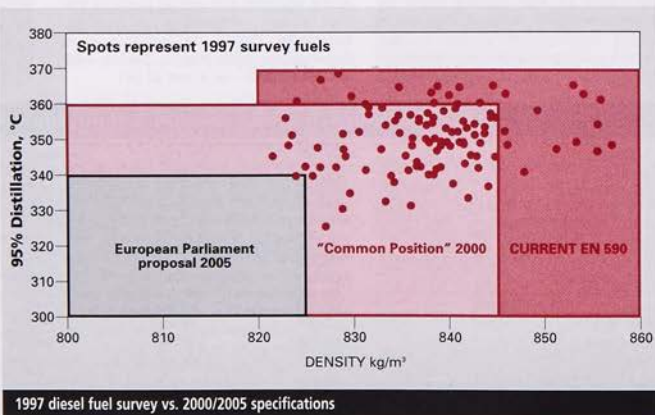
New European emission limits for heavy duty vehicles, to apply in 2000, have been announced. These are coupled with two new test procedures designed to reflect real-world conditions more accurately: a new steady-state cycle with a dynamic smoke test will be used for all conventional HD diesel engines, while those with advanced aftertreatment (de-NOx catalysts and/or particulate traps) will also have to pass a new European transient test cycle.

Advances in car fuel economy

The introduction of the direct injection engine – initially in diesel form but most recently in gasoline versions – is probably the biggest single advance in passenger car fuel economy for many years. Three manufacturers, Mitsubishi, Toyota and Nissan now have gasoline direct injection (GDI) engined passenger cars on the market, and all other manufacturers seem destined to follow.

The three Japanese engines differ in detail, but when it comes to aftertreatment there are yet further differences. For Europe, Mitsubishi has modified the catalyst system used in Japan, opting for a selective reduction version, and sacrificing performance in the interest of compatibility with relatively high-sulfur European fuels.

In contrast, Toyota uses a 'storage and reduction' catalyst system, and – because it will not work with relatively high-



sulfur European-quality fuels – the company has delayed introduction of its D-4 engine on to the European market.

GDI performance in the field is largely unknown and it is not known whether lubricants will need to be optimised for the type. There are also unanswered questions concerning potential deposit formation in injectors and elsewhere, and about wear in the fuel injection system caused by high pressures combined with low fuel lubricity. Catalyst durability is yet another concern.

Common rail diesel injection

The fuel injection system has been the main focus of efforts to reduce emissions of particulates and NOx from the diesel engine and the most important development of it is the common rail.

Essentially, it provides the engine with a source of fuel at a stable high pressure – which gives earlier, cleaner combustion. It is not known if there will be any impact on fuel quality, but all the recent designs run at significantly greater system temperatures, with regular readings as high as 150°C. There could be a potential need for stabilisers, antioxidants or new detergents. With fuel quality in the marketplace subject to other changes – primarily because of sulfur reduction – this will be an area to watch.

Because of the improvements in diesel fuel injection, it seems unlikely that De NOx catalysts or particulate traps will be needed to meet 2000 emissions legislation for passenger cars or heavy duty vehicles. Limits in the 2005 legislation present a different picture, however, and the OEMs seem to see no other way to meet them.

The gasoline engine situation is much clearer. Current three-way catalysts work very well when they reach operating temperatures and the primary aim now is to improve their efficiency during cold starting. However, lean-burn GDI engines require new de-NOx technology and there may be discussions about whether very-low-sulfur fuel is needed to make it work.

Diesel engine de-NOx traps are being developed but they seem to be many years behind their gasoline counterparts. An alternative finding success with stationary applications is selective catalyst reduction (SCR). However, it takes up a lot of space and makes the concept unsuitable for passenger cars.

Particulate traps still seem to be the least-favoured OEM option because of their inherent unreliability, but there may be no other emission-reduction route for 2005. Regeneration by burning may be possible for commercial vehicles, but additive catalysis seems to be the best of several less-

than-ideal options for passenger cars.

Hybrids may be a power unit for the future that will avoid all these problems. Each unit has more than one power source – combining, for example, an internal combustion engine, an electric motor and a battery, or an engine and a flywheel. Modern electronics and pressures for fuel economy are behind this trend – with a mass of new prototypes as the result.

The market leader seems to be Toyota, whose Prius model is currently on sale in Japan and may appear in Europe by the millennium. The vehicle has a 1.5 litre gasoline engine but uses electric power for initial acceleration. When it slows down, regenerative braking converts kinetic energy into electricity and when it stops, the engine is turned off automatically. Fuel economy is achieved by using each power source to optimum effect with the gasoline engine providing top-up when needed.

It is not clear yet whether hybrid vehicles will have any special fuel or lubricant needs but, at the moment, a potential drawback is their anticipated production cost.

Refinery trends

Complying with the stringent new European specifications for the year 2000 will require the reduction of sulfur content – from 500 ppm to 200 ppm for gasoline, and to 350 ppm for diesel. This will demand additional desulfurisation capacity at some refineries, and the reduction in total aromatics and benzene content of gasoline will be even more difficult to achieve. Reconfigured refinery processes and significant investment will be essential.

Further ahead, the proposed sulfur reduction to 50 ppm in 2005 for both gasoline and diesel will be a major challenge. The estimated capital cost of complying with the new specifications (2000 and 2005) ranges from \$12bn to well over twice this amount.

Because of such obligations, refiners are evaluating all kinds of new technologies. Biocatalytic desulfurisation is just one possibility, using enzymes to remove sulfur from petroleum products. The process could prove cheaper than conventional hydrofining but is still at the pilot plant stage and will require more development before a refinery unit is built.

Somewhat further away are gas-to-liquid processes which convert natural gas into liquid products. These could include high-quality diesel, kerosene, naphtha and di-methyl ether, a potentially very clean-burning substitute for diesel fuel. Such products – free from sulfur, heavy metals and aromatics – could be used directly or as blending

components to upgrade fuel quality.

Re-balancing diesel fuel supply and demand (including heating oil) will become increasingly difficult. The accompanying graphic shows the density and 95% distillation characteristics of today's winter diesel fuels – and the box into which they will have to fit in 2000. In the case of summer fuels, far more of today's products would be outside the box.

What does the refiner do? Kerosene can be added or light cycle oil removed to reduce density. Either way the supply/demand balance will be upset, and in addition the new fuels will probably respond differently to additive technology. The other Euro 3 targets (sulfur and aromatics) will also have an indirect impact. Overall, it looks certain there will be plenty of work for the oil and additive industries between now and 2000.

Alternative fuels

There is a growing interest, driven by the legislators, in alternative fuels – primarily compressed natural gas, liquefied petroleum gas and biofuels, especially fatty acid methyl esters (or RME as it was previously known).

City Diesel is not an alternative fuel in the conventional sense, but its European market share is showing steady increase. However, it is not a consistent product throughout Europe, and its density is often not as low as that of Swedish Class 1 fuel. Some governments, Britain's included, are giving modest fiscal incentives for its use and we can expect incentive schemes to grow now that the details of Auto Oil are settled.

CNG- and LPG-powered heavy duty vehicles have lingered in a legislative vacuum for some years, but they will receive attention in the 2000 emissions legislation.

Biofuels do not seem to be popular with anyone except farmers – and certainly not with environmentalists. The European Commission has issued a mandate to CEN to develop three new specifications for biofuels. CEN has also negotiated to create a fourth specification.

This last specification is being developed for two reasons. First, EN590 was intended to apply only to hydrocarbon fuels, and not to products containing significant other components. Second, the European Commission has made it clear that its primary objective is to ensure free access for agricultural products into the fuels market.

Lubricants

The Association des Constructeurs Européens d'Automobiles (ACEA) introduced new crankcase lubricant tests
continued on p18...

Colombia looking for more giant fields

Since the late 1980s all oil discoveries of over 300mn barrels in the Western Hemisphere have been made in the northern part of South America. In 1988 Cusiana in the Llanos Basin was discovered by BP. Cupiagua, found in 1993 (1.6bn barrels booked, with potential for developing 2bn barrels), was the largest discovery in the Western Hemisphere since Prudhoe Bay (13bn barrels) in Alaska in 1968. There is great confidence that in the next five years further major discoveries will be made in this region particularly in the Magdalena basins, reports *Priscilla Ross*.

The whole of Colombia has potential reserves of 37bn barrels but its proven reserves are only 2.8bn barrels. This compares with proven reserves of 46.9bn barrels for Venezuela and 48.8bn barrels for Mexico.

Recent discoveries in the Magdalena Basin include Seven Seas' Emerald Mountain/El Segundo, Amoco's Opon, and Lasmo's Revancha and Venganza oil fields. Revancha and Venganza have been renamed Matachin Sur and Matachin Norte respectively.

There have been press reports that Opon's results have been less than favourable. An Amoco spokeswoman told *Petroleum Review*: 'Fairly extensive testing is going on to determine why the wells are behaving the way they are.' She declined to give a reserve estimate.

The jury is still out on whether Emerald Energy has a discovery at Chawina in the Magdalena Basin. There is said to be a one-in-five chance that potential reserves attributable to Emerald could be more than 500mn barrels rather than the original 140mn barrels estimated. Emerald has additional seismic interpretation which shows that the structure is significantly larger than first thought. It has secured the 40% residual interest held by original licensee, Petroleos del Norte, in return for \$1.8mn plus a 6.75% well-head royalty, both subject to a declaration of a commercial find.

While Chawina is a thrust play, with all the geological complexity and associated pressure problems, Emerald's Gigante prospect on the Matambo licence in the Upper Magdalena is a relatively simple anticlinal feature. Emerald has farmed-out this property to Monument Oil and Gas. Texaco abandoned the original Gigante well in 1992 after testing 1,800 b/d. Drilling began in early May 1998 and should take 90 days to test and complete.

Oil, like any other business activity, has its fair share of special situations and three immediately spring to mind in this context. The Colombian state oil company Ecopetrol has invited foreign companies to bid for oil concessions in 17 areas, which should eventually encompass 36 concessions. Other opportunities are the Lasmo sale and the sale of Hondo Oil & Gas Company.

The auction of the state concessions is essentially a come-on for foreign

investors to develop marginal or deep fields. Also for the first time offshore concessions and offshore exploration is on offer and is likely to be popular with oil companies wishing to offset the guerrilla threat around the riskier onshore sites.

The Colombian state via Ecopetrol can back in for 50% when an economic discovery has been declared. Ecopetrol then assumes 50% of the development and operating costs of the project. At that time the operator may also be reimbursed for 50% of its share of previous expenditure on exploration appraisal wells.

In the present bidding round the concessions hold between 5bn and 9.4bn barrels in possible reserves and foreign investors might have to invest between US\$220mn and US\$560mn in developing the fields in the initial three years of the concession.

Under present production sharing arrangements, the foreign investor has had to foot the bill for developing a new oil field but has to share the proceeds of a discovery with Ecopetrol. BP, one of the biggest investors in Colombia, has been pressing for changes in existing contracts.

The government's official line on the timing of the present bidding round centres on its belief that if foreign investment is not encouraged and no new sizeable fields are discovered, the country will degenerate into a net oil importer as early as 2004 (see *Petroleum Review*, July 1998).

A controversial change has been made to existing sliding scale association contracts. The 16 companies already participating in production sharing agreements with Ecopetrol, by giving up unexplored areas and acquiring 25% of them back under the new terms prevailing under the new bidding round, will result in Ecopetrol getting a scaled down share of any oil that it may discover. For their part the companies are permitted to explore 25% of their previous allocated areas and the remaining 75% of the areas will be put up for public auction.

Lasmo has been operating in Colombia since 1984 but with the UK and Indonesia as its traditional core areas. However, last year's phenomenal discoveries in Pakistan, Libya and Algeria, and entry into Venezuela, mean that Colombia has been pushed



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down the list of priorities. Lasmo has now decided to sell its Colombian interests, which include a very minor share in an export pipeline from its Magdalena Basin and Llanos Basin fields. The pipeline tariff is \$1.30/b. In January 1998 Lasmo's Colombian production averaged 14,000 boe/d with proven plus probable reserves of 45mn boe.

Drilling costs of \$2mn to \$4mn a well in the Magdalena Basin are relatively low, putting exploration activities within the reach of smaller companies.

Further news of Lasmo's withdrawal from Colombia is likely to be forthcoming in 3Q1998.

At the opposite end of the scale drilling costs are considerably more expensive for deeper and more complicated wells such as the Opon prospect where Hondo Oil & Gas Company

needed a farm-out to Amoco to fund the high-risk exploration expenditures.

Hondo Oil & Gas is now itself in play. It is a subsidiary of the UK conglomerate Lonrho, which in the interests of becoming a pure mining company is intending to sell the Group's investment in Hondo Oil & Gas. Lonrho owns 76.4% of Hondo's equity.

But the Magdalena basins are not the only exploration plays in Colombia. The Llanos Basin is where the recent growth trend began when Occidental discovered the Cano Limon field in 1984. Cano Limon has recoverable oil reserves of 1.7bn barrels. Cusiana and Cupigagua (1.6bn booked and potential for developing 2bn barrels) are also in the Llanos Basin and other notable fields are Santiago, 56mn barrels; Trinidad, 54mn barrels; La Gloria, 25mn barrels;

Guartimena, 8mn barrels; and Rachso Hermosa, 5mn barrels.

In 1997 Harken Energy discovered Estero-1 in the Llanos Basin, which tested more than 4,000 b/d. To put this into some sort of context Revancha tested 6,400 b/d and Venganza 2,600 b/d. It is believed Estero-1 has a gross reserve potential of between 20mn to 50mn barrels of recoverable oil. Harken also has the third largest exploration land position in the Magdalena basins.

Emerald Energy's Vuelta Larga block adjoins Harken Energy's Alcaravan block. Four low risk prospects with potential reserves of 25mn barrels have been identified and a drilling programme largely financed by listed Canadian company TecnoPetro through a farm-out deal will commence early in October 1998.

However, the major deterrent to investing in Colombia is political risk. Ever since the Cano Limon field came into production its operations have been disrupted by the activities of the National Liberation Army (ELN).

BP recently shut down two wells in the Florena area temporarily due to the deteriorating security situation there but they are now back up and running.

Security costs are high

Estimated remaining reserves at Cusiana/Cupigagua are 1,409mn barrels. BP is the operator and has a 19% interest and its net share or production has grown from 20,000 b/d in 1995, to 26,000 b/d in 1996 and 33,000 b/d in 1997.

One fund manager summed up his investment qualms about certain Latin American countries as follows: Colombia, because of safety risks for personnel; Venezuela, for legal uncertainty; and Panama, because of corruption.

But exploration will continue in Colombia because the country is ranked highest of all countries in terms of average new field size discovered – 187mn boe.

Quite remarkably, output from the Cusiana/Cupigagua complex has grown

from 185,000 b/d in 1996 to 300,000 boe/d in 1997 with the second phase development. Current forecasts are for 500,000 b/d in 1998. Once the \$2.1bn Covenas pipeline is completed Colombia's production is set to almost double in 1998, to 960,000 b/d of which 300,000 b/d is exported.

From 1950 when oil exploration first kicked off in Colombia to 1995 an estimated 7bn barrels of oil and 8tn cf of gas had been found in the country. These reserves are all the more impressive because they do not include the most recent discoveries such as Emerald Mountain/El Segundo and the Matchin North and South fields.

The Emerald Mountain/El Segundo discovery is being appraised now and the ultimate size of the structure could be up to 120mn barrels of recoverable oil. Matchin North and South are unofficially estimated to contain 50mn barrels of recoverable oil.

From 1900 to 1966 some 266 oil fields were discovered in Colombia, 25 of which were discovered between 1991 and 1995 and account for 30% of total reserves discovered.

Some 74% of the fields are less than 10mn barrels in size of which about 50% are situated in the Magdalena basins. The five biggest fields discov-

ered in Colombia account for about 35% of total reserves.

Current exploration theory is that the way in which the thrust fault play developed in the Llanos and Magdalena basins favoured fields with reserves greater than 100mn barrels. Cusiana, Cano Limon, Emerald Mountain/El Segundo and Opon are all located in faulted fold structures. Both the Llanos and Magdalena basins hold good potential for discoveries to be made in the deeper horizons.

Oil is Colombia's main export and the government's drive to encourage foreign investment with the latest bidding round underscores the importance of this sector to the economy. Recent moves make the exploration play more attractive to new foreign investors at the expense of existing investors in production sharing arrangements and this is seen as setting a worrying precedent.

The exploration prospects, while lower than for Venezuela, remain commercially interesting. At \$2mn to \$4mn for an exploration well in the Magdalena basins, it is within the reach of the more junior explorers. For example Triton had mega-finds in the early 1990s. However, large companies like BP will usually be needed to commercialise major finds.

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...continued from p15

from 1 March 1998 and for the first time mandated specific types of lubricants, for both gasoline and diesel, to provide a minimum fuel benefit.

In the passenger car sector, it is clear that the lubricant marketers still regard approvals from Volkswagen and Mercedes-Benz as the basis of performance claims for their mainline oils.

In 1991 the effects of emissions legislation in the US began to be noticeable. The OEMs' response to reduced NOx levels was to retard injector timing, which led to higher oil-borne soot loading. This was countered in the field by OEMs adjusting their electronic units to reduce soot loading but this caused greater emissions of NOx. The Environmental Protection Agency (EPA) and Engine Manufacturers Association (EMA) are negotiating but, whatever the outcome, higher soot loading looks inevitable.

To meet US emission limits in 2004 there is a clear trend towards the use of

exhaust gas recirculation. Discussion is already underway to determine the need for and timing of a new standard.

Automatic transmission fluids

Over the next five years the sales graph for automatic gearboxes curves resolutely upward. By 2005 automatics will be fitted to over 35% of cars produced in Western Europe (up from the current figure of 15%) and by 2015 manual gearboxes will have been overtaken.

The future of automatic units seems to be with five-speed continuously variable transmissions (CVTs) but a new generation of continuously slipping torque converter clutches (CSTCCs) is also being developed. Transmissions of these types help both emissions and fuel consumption, but the quest for fuel economy and efficiency also drives the need for special – sometimes OEM-specific – fluids. The consequences are increased stress on fluids through smaller, hotter boxes, longer service intervals and the rise of fill-for-life lubricants.

The most likely solution will be lower-

viscosity fluids, and enhanced oxidative and thermal stability. In particular, CSTCC fluids need enhanced friction durability, while new-generation CVTs (now using steel belts on steel pulleys) present friction control challenges which current automatic transmission fluids do not meet.

Manual gear oils

Again, smaller, hotter boxes and the need for sustained performance are imposing demands on manual transmission fluid which push it to the extent that the OEMs will continue to overlay their own special requirements. Pressures for specialised fluids, fill-for-life manual transmissions, ever-longer drain intervals and; improved synchroniser performance will all segment the market and keep formulators busy in the coming years.

For more detailed coverage of the topics reviewed a booklet is available from Rose Gill, Paramins Business Centre, PO Box No 255, Abingdon OX13 6TT, UK.

Bulk Storage *Survey*

1998



Industry review

Oversupply of oil storage capacity

Map of Europe

Where the facilities are located

The 1998 survey

Alphabetical list of all operational terminals fully updated from last year

Petroleum Review's annual roundup of the bulk storage industry in western Europe

European oversupply of oil storage capacity

If the failure of the proposed merger between Europe's two largest independent bulk liquids storage terminal operators, Pakhoed and Van Ommen, this June tells us anything, it is that the European Commission is aware that the independent oil storage business in northern Europe is so delicately balanced that it could not countenance any further concentration.

To assuage the Competition Directorate the two parties had offered to sell off nearly 1.5mn cm of storage capacity for chemicals and vegoils in Rotterdam but the EC's Merger Task Force wanted another 0.5mn cm of oil storage to go before giving the proposal its blessing. This would have meant the disposal of Pakhoed's flagship 1.5mn cm Botlek oil terminal instead of Van Ommen's smaller chemical and oil facility nearby – a step too far for Pakhoed which immediately pulled out of the merger plan.

The merger was first announced at the beginning of March 1998, when the oil storage sector was just recovering from a very poor 1997. Technical factors, in particular a persistent backwardation in the gasoil futures market, had reduced demand for storage capacity for oil products. This situation eased over the winter months, helped by generally mild conditions which cut end-user demand and left a lot of product in storage.

Despite this increase in demand and the improved returns it has generated for terminal operators, it is evident that northern Europe is oversupplied with oil storage capacity, particularly in the Le Havre-Hamburg corridor and along the UK east coast.

Long-term trends, notably the restructuring of the European and North American downstream oil industry and the preference for smaller inventory holdings, have impacted demand for independent storage and outweighed the general rise in oil demand.

Furthermore, analysts predict that the increasing number of product grades mandated by the varying air quality standards and regulatory regimes around the world will mean that trade in oil products will become progressively more restricted to intra-regional movements.

Taking the initiative

On the bright side, independent terminal operators may be able to take advantage of the growing desire of oil and chemical companies to outsource non-core activities. In the US there have been a large number of divestments of small terminals by oil companies with these facilities being bought by independent operators and there have been signs that a similar process may develop

in Europe. Dutch independent Petroplus has already built up a sizeable chain of former oil company-owned terminals in northern Europe.

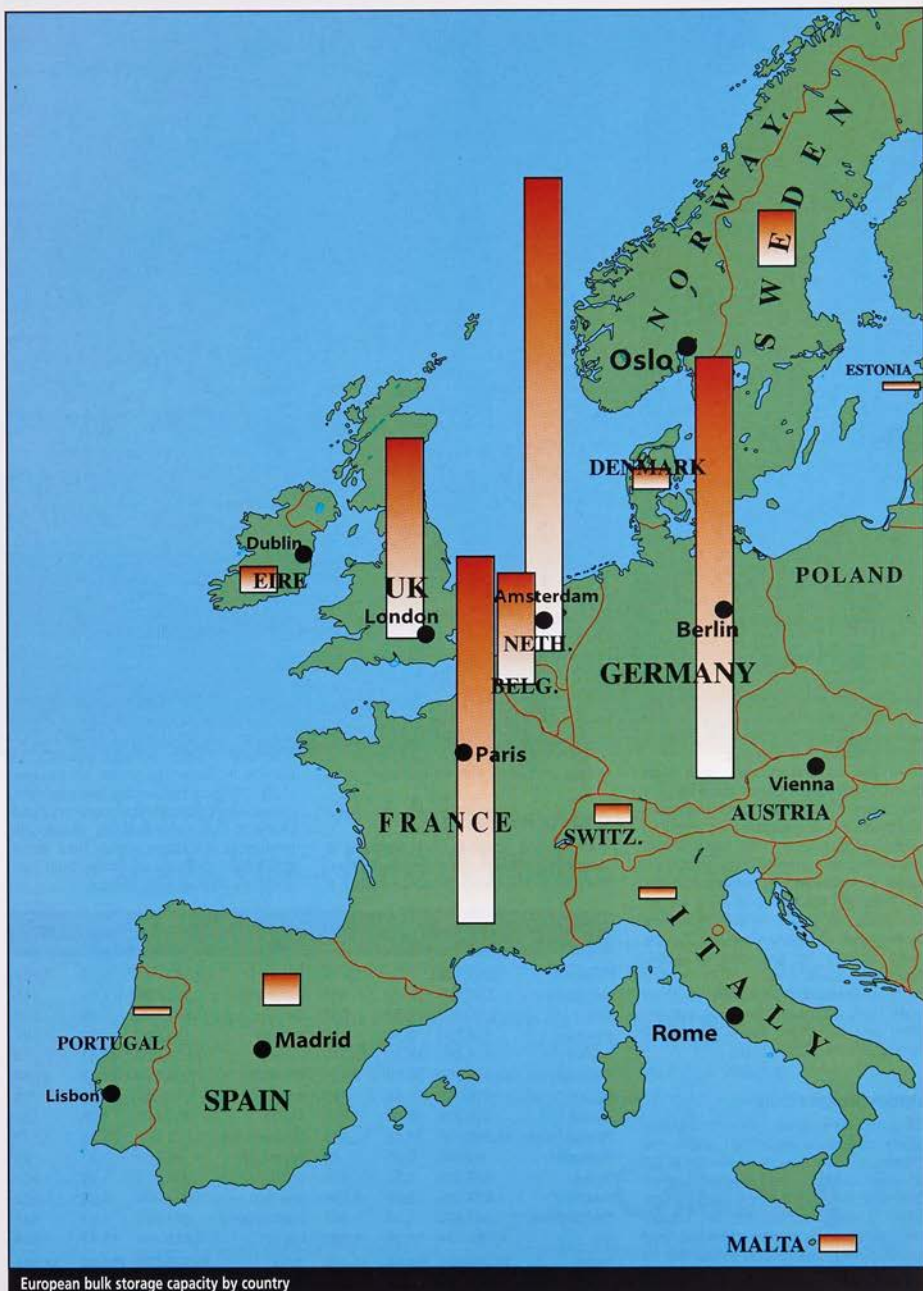
Given the general level of oversupply of tankage in Europe, terminal operators looking for a competitive edge are increasingly looking towards value-added services, even if this just means offering additivisation, blending, drumming or other services at little or no extra cost. Those operators whose own assets include other elements in the logistics chain can also offer fully integrated storage/processing/transportation services, although the main stumbling block to the development of such businesses often seems to be the customer's unwillingness to hand over control of too many elements in the delivery chain.

In spite of this rather unprepossessing outlook, some new tankage is still being built in Europe – and not just in the developing markets in the Baltic states and eastern Mediterranean. Following the completion of a major jetty upgrade at its Immingham West terminal on the UK's east coast, Simon Storage is adding new tanks at the neighbouring Immingham East site. Demand for new tankage is particularly strong in Spain, where Capesa, a subsidiary of Italian operator Decal, has boosted gasoline and gasoil capacity at its Barcelona and Huelva terminals by more than 100,000 cm in recent years. CPA is also adding more than 30,000 cm of new capacity at its St Priest terminal near Lyon and is upgrading some tanks from distillates to gasoline use.

Overall, however, it is chemical storage capacity that is being built and in some cases operators are upgrading oil storage to be able to handle chemicals. Gamatex, the GATX/Van Ommen joint venture terminal in Antwerp, is one that has recently converted some tanks and Oiltanking is also handling more chemicals and less oil than previously.

Optimising operations

As well as adding or upgrading their tanks, terminal operators are looking at ways to make their facilities more efficient. Investment is being targeted particularly at automation systems, if not on a facility-wide basis then at least at the loading rack. Such improvements not only help to increase the flow of vehicles



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Bulk storage in Rotterdam, including Pakhoed's flagship 1.5 cm Botlek oilterminal

using the terminal but also make the terminal more attractive to its customers by reducing waiting time and speeding up documentation and invoicing.

On the regulatory side, the main thrust of investment over the past year has been in vapour control systems which are being mandated on a rolling schedule between 1995 and 2004, depending on terminal throughput, via national legislation in response to the EC Gasoline Directive (94/63/EC). Larger terminals, ie those with a gasoline throughput of more than 50,000 t/y, must comply by the end of 1998. Terminals have also had to install bottom loading equipment at their truck bays, although there has not yet been any definitive move on vapour control at the marine end.

Under inspection

Oil terminals may also soon find themselves subject to inspection under the Chemical Distribution Institute (CDI) scheme set up by the European Chemical Industry Council (CEFIC). CDI, which already administers an inspection database covering chemical and gas shipping, last month rolled out its terminals scheme, CDI-T. Although this is primarily aimed at the chemicals

sector, a number of the chemical company participants use oil terminal capacity for their feedstocks and some of the independent storage companies taking part also offer oil tankage.

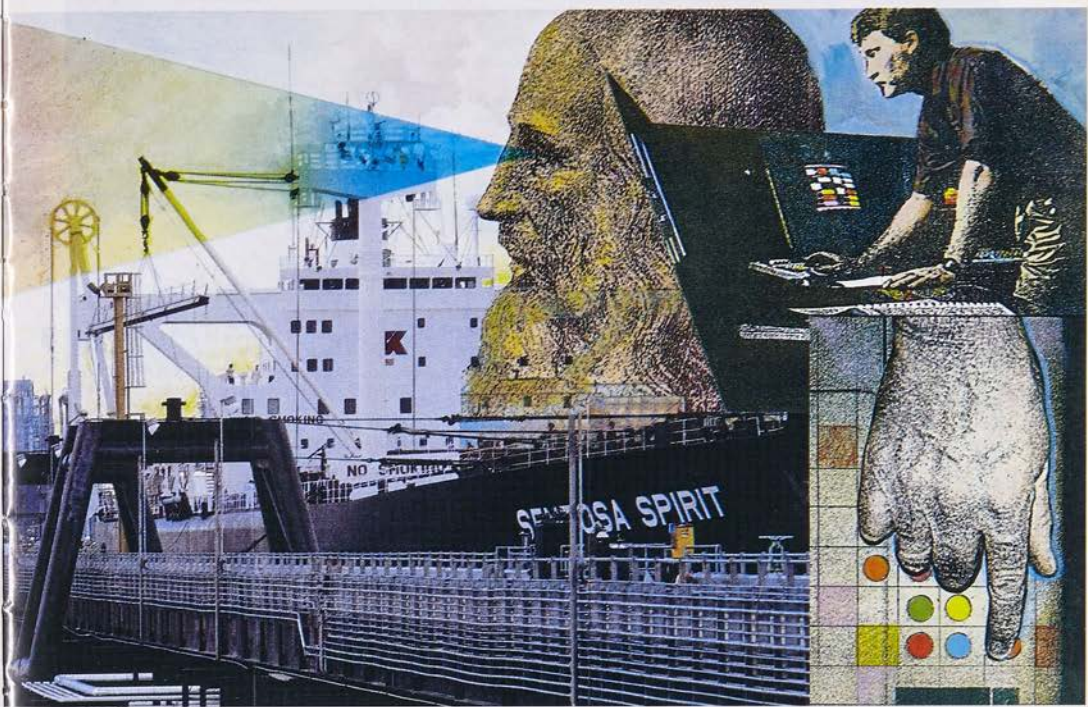
Quality is key

Under the scheme, each terminal is subject to a full audit every two years, the results of which are maintained on a

database so that prospective customers can check that the facility meets its own requirements and safety standards.

The bulk liquids storage business in Europe is labouring under an increasingly stringent regulatory and commercial environment. Those operators most likely to come out of this phase still profitable are those which take these challenges seriously and offer their customers a high-quality service.

1997 % total				1998 % total			
,000 cubic metres rounded				,000 cubic metres rounded			
Belgium	1,656,100	4.54	1,656	Belgium	2,142,320	6.33	2,142
Denmark	354,500	0.97	355	Denmark	354,500	1.05	355
Eire	5,00,000	1.37	500	Eire	507,000	1.50	507
Estonia	196,000	0.54	196	Estonia	196,000	0.58	196
France	7,079,000	19.41	7,079	France	7,058,000	20.87	7,058
Germany	7,436,000	20.39	7,436	Germany	7,994,100	23.63	9,654
Italy	210,000	0.58	210	Italy	210,000	93.75	210
Malta	359,000	0.98	359	Malta	359,000	1.06	359
Netherlands	12,548,000	34.41	12,548	Netherlands	9,076,000	26.83	7,527
Portugal	90,000	0.25	90	Portugal	90,000	0.27	90
Spain	573,247	1.57	573	Spain	604,165	1.79	604
Sweden	1,034,000	2.84	1,034	Sweden	1,022,000	3.02	1,022
Switzerland	347,000	0.95	347	Switzerland	347,000	1.03	347
UK	4,082,174	11.19	4,082	UK	3,865,294	11.43	3,865
Total	36,465,021	100.00	36,465	Total	33,825,379	100.00	33,964
Total European storage capacity by country							



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Bulk Storage Survey 1998

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Bantry Terminals Ltd, a subsidiary of Irish National Petroleum Corporation (INPC), owns and operates a crude oil storage terminal on Whiddy Island in Bantry Bay, SW Ireland. A single point mooring (SPM) discharge and loading facility has recently been commissioned. The SPM is designed to handle vessels up to 320,000 dwt and is situated in an area where water depth is in excess of 30 metres.

Onshore there are 12 main crude oil storage tanks, each with a capacity of approximately 80,000 tonnes. While not all these tanks are currently in service, there is a working crude oil storage capacity in the range of 300,000 to 400,000 tonnes.

The facility is suitable for both storage and trans-shipment of crude oil.

Barrow Storage Co LTD

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Three installations: One at Marshmeadows, New Ross, Co Wexford, Eire. Storage for 16,000 cubic metres of petroleum products, including LPG. The berth on the River Barrow is capable of handling vessels up to eight metres draught. Tankage includes a 4,500 cubic metres tank which is heated and insulated. One at Dundalk with 2,500 tonnes of gasoil and kerosene. A sea-fed chemical storage plant in Tivoli, Cork with 2,000 tonnes of caustic liquor soda and plans for further chemical, oil and LPG extensions. Barrow Storage is a member of the Clashfern Group, which also includes Oikos Storage Ltd on the river Thames at Carvey Island, Essex, UK.

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Tankweg 1, 21129 Hamburg, Germany
Tel: +49 40 740007 0 Fax: +49 40 740007 32

Storage for a range of liquid cargoes and facilities to trans-ship these products. Imports and exports from the site by all the main transportation means. Located in an established petroleum port with the ability to handle dangerous goods in compliance with the relevant regulations. Good road and rail links with a separate rail siding.

Technical equipment:

Tank space: there are 70 tanks in total with a gauging volume of 224,000 cubic metres for the storage of liquid cargoes. The A 111 tank space is equipped with heating coils. A number of tanks have double bottoms and insulation and the site features security devices to protect from over-filling. Two of the tanks have full coatings for high quality products. Tank sizes range from between 50 and 25,000 cubic metres.

Turnover:

Eight water berths. Maximum tonnage not to exceed 80,000 dwt. Maximum length is 260 metres, 42 metre beam, and maximum draught is, at present, 10 metres. On the shore side there is a charging and discharging station. The filling station is integrated in the vapour recovery unit. For tank vehicles there are six platforms with volume metres, scales and four other discharging/charging stations.

Heating: For the heating of products the company operates two large boilers with a total output of 38 tonnes of steam per hour.

For the product turnover there are various pipelines and pumps, which are partly refined steel in order to guarantee the product security.

There are two components blending installations with a maximum output of 480 tonnes per hour. An extension of the components is possible after an appropriate period of preparation. The installations are able to blend from IFO 30 to IFO 380.

The site offers slop recovery facilities for oil-water mixtures and the dis-

posal of waste water according to the MARPOL-Agreement.

Range of liquid products:

Mineral oils; chemicals; vegetable oils and greases; paraffins and waxes; and fertilisers.

Miscellaneous:

Computer-based storage handling facilities are available for commercial settlements and there are various customs store permits for customs clearance.

In addition to the Hamburg terminal, the company also operates a tank farms at Bremerhaven and Kiel.

BTP Storage LTD

Hayes Road, Cadishead, Manchester M30 5BX, UK

Contacts: Site Director, D Clancy; Terminal manager, D Ripley

Tel: +44 (0)161 775 3945 Telex: 669938 Fax: +44 (0)161 775 3970

Part of the BTP plc group of companies. The installation occupies a 20-acre site on the north bank of the Manchester Ship Canal. Total tank capacity of over 100,000 cubic metres with a range of tanks up to 6,000 cubic metres capable of handling most types of petroleum and chemical products. Blending, drumming and weighbridge facilities available. Rail sidings for up to 1,400 tonnes. Berth: maximum draught 24.5ft, approximately 6,000 tonnes. Easy access to the M6 and M62 motorways.

Compagnie Industrielle Maritime (CIM)

36, rue de Liège, 75008 Paris, France

Tel: +33 1 43 87 33 49 Telex: 280330 CIMDGA Fax: +33 1 43 87 43 08

Contacts: Mr B Salaün (Sales Manager) Direct Line: +33 1 43 87 43 14

Fax: +33 1 42 94 02 81

CIM is an independent French company which owns and operates a modern and highly sophisticated storage, trans-shipment and break-bulk facility capable of handling crude oils, distillates and all clean petroleum products. The complex, which is situated in France at Le Havre and Antifer, has a total capacity of some 5.2 million cubic metres. At Antifer, only crude oil tonnage in excess of 250,000 tonnes dwt is handled with the port capable of handling the world's largest tankers. At Le Havre, the smaller crude oil carriers (under 250,000 tonnes dwt), light distillates and all other clean petroleum products are handled.

There is a pipeline link allowing cargo to be transferred from Antifer to Le Havre (where it can be back-loaded after storage if required). All cargoes stored and handled are in a customs bond warehouse and CIM prides itself on maintaining its clients' confidentiality.

CIM now owns all equipment at the Antifer terminal, which consists of four tanks of 150,000 cubic metres each, and two of 22,500 cubic metres each with an overall capacity of 645,000 cubic metres. Access is by sea. Sea berths with draughts of 98ft and 82ft respectively. Facilities for discharging ULCC-type vessels up to 550,000 tonnes and for trans-shipments.

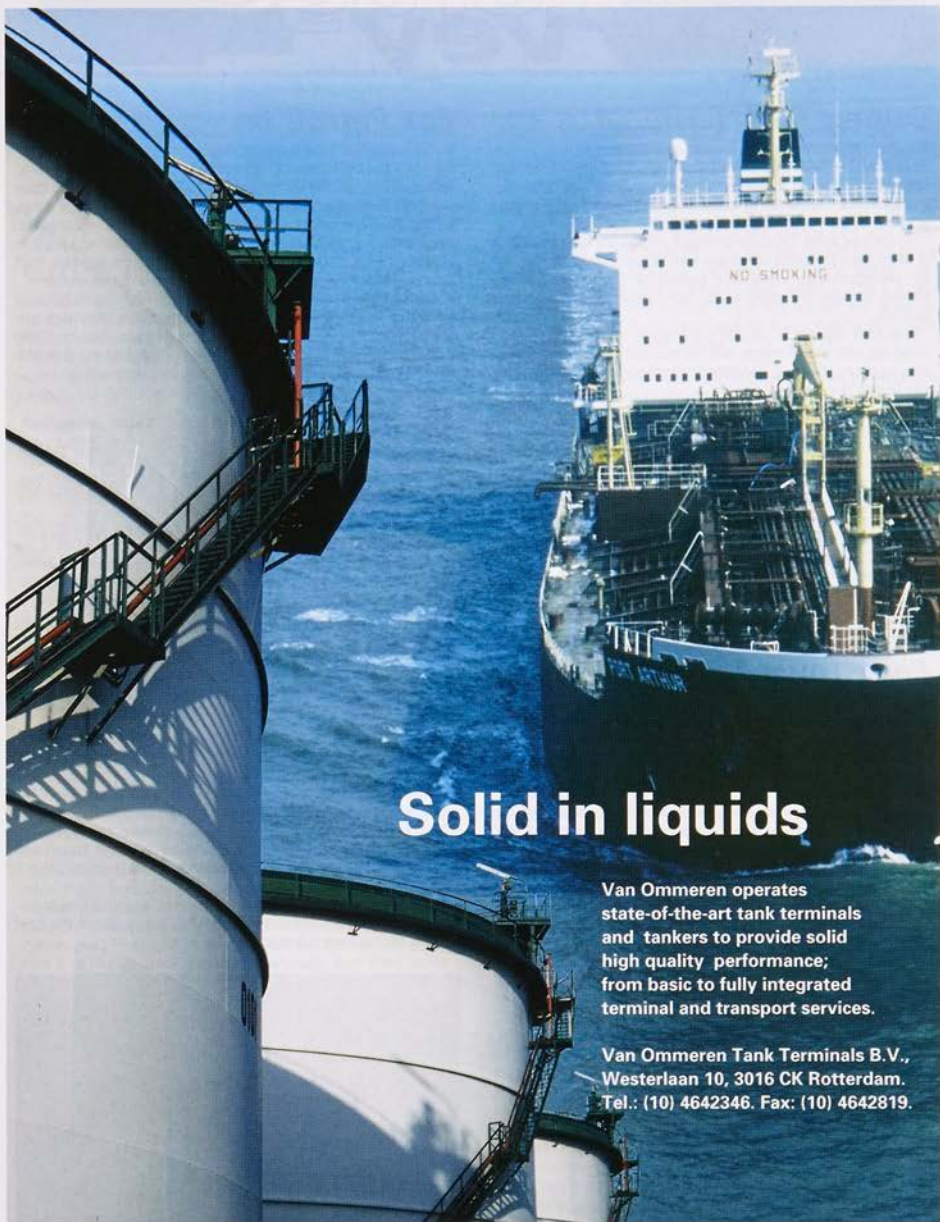
Comos Tank BV

Octaanweg 14, 1041 AN Amsterdam, The Netherlands

Contact: Mr Ruud Steenken Tel: +31 20 587 2121 Telex: 13121

Fax: +31 20 587 2150

A subsidiary of VTG Vereinigte Tanklager und Transportmittel GmbH. Operates a terminal with an overall capacity of 700,000 cubic metres for storing all petroleum products and bulk chemicals. Tanks range from 3,500 to 40,000 cubic metres, some coated or insulated and equipped with heating-coils. Blending facilities for gasoline, heavy fuel oil and gasoil and facilities for loading, product washing and butanising are available. Three jetties for seagoing vessels and eight jetties for barges. Distillation towers for processing are available to ensure efficient storage and transfer.



Solid in liquids

Van Ommeren operates state-of-the-art tank terminals and tankers to provide solid high quality performance; from basic to fully integrated terminal and transport services.

Van Ommeren Tank Terminals B.V.,
Westerlaan 10, 3016 CK Rotterdam.
Tel.: (10) 4642346. Fax: (10) 4642819.



Van Ommeren
Transport & Terminals

Bulk Storage Survey

Dupeg Tank Terminal

Terminal: Tankweg 4, D-21129 Hamburg, Germany
Tel: +49 40 740 440 Fax: +49 40 740 44140

Dupeg Tank Terminal in the Port of Hamburg specialises in handling liquid cargoes. The handling facilities at Waltershof Petroleumhafen are some of the most modern in Europe.

On average, some 150 different liquid cargoes are stored each year in more than 100 tanks which can take virtually any kind of cargo, eg petrochemicals, chemicals, turpentine products, industrial alcohol, alcoholic beverages, acids, alkalis, vegetable and animal oils and fats.

Total tank capacity is 130,000 cubic metres of which one-third is fitted out with special linings, and the qualitative treatment of products, eg mixing, filtering, clarifying or standardising, is part of the service Dupeg Tank-Terminal offers.

Individual tanks of 20 to 10,000 cubic metres, including 26 stainless-steel tanks totalling 17,500 cubic metres.

Dupeg's management system is accredited with the DIN ISO 9002 quality control standards. In accordance with the terms of the International Marine Pollution Convention (MARPOL), Dupeg Tank-Terminal serves as the recipient for chemical slops from ships calling at the Port of Hamburg.

Transport links include: two pontoon bridges for ocean-going ships of up to 35,000 dwt (depth of water: 13 metres); container ramps and lighter berths for handling barrelled cargoes; own sidings complete with tank wagon filling station; linked to European motorway system via neighbouring A7 Autobahn.

Felixstowe Tank Developments LTD

FTD House, The Dock, Felixstowe, Suffolk IP11 8SE, UK
Tel: +44 (0)1394 676112 Fax: +44 (0)1394 673590

Ninety-two mild and stainless steel tanks, totalling 64,000 cubic metres storage capacity, equipped to handle a comprehensive range of liquid, edible, chemical and petroleum products. Road and container tank load and discharge. Tank capacities 30 to 2,800 cubic metres, product heating, steam, hot water and electric. Lined and insulated tanks, stainless steel pipelines, gas purging, water cooling. Alcohol, hydrocarbon and IDA bonds available. Tanker berth 9.1 metres draught - 180 metres length. With additional services including drumming, methylation, dilution, blending and 50,000kg capacity public weighbridge.

FETSA

Federation of European Tank Storage Associations, Avenue E Van Nieuwenhuysse 6, B-1160 Brussels, Belgium

Tel: +32 2 676 74 94 Fax: +32 2 676 74 95 e-mail: FETSA@FEC.org

The Federation of European Tank Storage Associations (FETSA) represents the seven national associations of Belgium, France, Germany, Italy, Spain, The Netherlands and the UK. In aggregate this is equivalent to 130 enterprises with a combined storage capacity of about 42 million cubic metres in Europe (1996 data). Tank storage companies that are through their National Associations represented in FETSA combine over 50% of the world storage capacity in bulk liquids. FETSA was established under the Law of the Kingdom of Belgium in 1992 and is headquartered in Brussels. Board Members: **President:** P R M Govaert, The Netherlands; **Vice-President:** G Bonetti, Italy; **Treasurer:** J F Adriaens, Belgium; **Member:** Dr H Abendroth, Germany; **Member:** R E Hartless, UK; **Member:** F López de Pablo, Spain; **Member:** O Mistral, France; **Secretary General:** H J P Standaar.

Fox Petroli spa

Via Senigallia N. 29, 61100 Pesaro, Italy
Tel: +39 721 40871 Fax: +39 721 403505

Total storage capacity of about 130,000 cubic metres of oil products (clean and dirty). Terminal in Pesaro Harbour for loading and discharging vessels. Services available: tank-truck loading/unloading, heated and insulated tanks and pipes, tanks equipped with recirculating systems, petroleum products dyeing, blending of oils and fuels, heat supply, tank-truck weighing, bunkering of barges with tank-trucks and custom services.

A Plant in Vasto (Ch) with a storage capacity of about 35,000 cubic metres connected to Vasto Harbour with two pipelines fit for high-temperature products. The plant has a production capacity of 55,000 tonnes/year of high quality standard Biodiesel (methyl ester of vegetable oil) obtained from vegetable oils processes in the plant's refinery.

Gamatex NV

Head Office: Haven 623, Scheldelaan 450, B-2040 Antwerpen, Belgium
Tel: +32 3 561 15 00 Telex: 32459 Fax: +32 3 561 15 27

Gamatex is a 50/50 joint venture between GATX Terminals Corporation and Van Ommeren and has one installation in Belgium.

Gamatex has a 48 ha site on Canal Dock B2 and the adjoining Inset Dock (berth nos. 621, 623, 625, 627 A and B). At present 28 ha of the site has been developed and 20 ha are available for further expansion. Gamatex specialises in the handling and storage of bulk liquids, particularly clean mineral petroleum products, gases and chemicals.

Total tank capacity is 486,220 cubic metres and is made up as follows:

- petroleum products: 320,000 cubic metres, with capacities ranging from 500 to 20,000 cubic metres;
- chemicals: 144,620 cubic metres, with capacities ranging from 70 to 7,500 cubic metres. This figure includes 10,500 cubic metres of stainless steel tanks;
- gases: 21,600 cubic metres, with capacities ranging from 1,600 to 2,800 cubic metres.

Five jetties offering an unvarying depth of 44 feet are available. The terminal is equipped with the necessary infrastructure for the rapid and efficient handling of truck and wagons. Each chemical tank is provided with a dedicated pump and product lines to the jetties and the railroad loading bays. As a result the risk of product loss and contamination is minimised.

The dedicated system makes it possible for (parcel) tankers to discharge their contents without wasting time, and facilitates the rapid loading of trucks and rail tankers.



Gamatex

Product requiring special care are stored in suitably modified tanks. The terminal is moreover equipped with a number of gas return systems, vapour processing units, automatic nitrogen blanketing, heating coils and blending systems. There is a modern drumming installation suitable for most products. The fumes from these products are neutralised in a specially designed scrubbing column. Gamatex is connected to several pipelines including PALL, CEPS and the NMP propylene line.

GATX Terminals LTD

Nicholson House, High Street, Maidenhead, Berkshire SL6 1LQ, UK
Tel: +44 (0)1628 771242 Fax: +44 (0)1628 771678

A wholly owned subsidiary of GATX Terminals Corporation of Chicago. GATX Terminals Ltd operates eight terminals in the UK. Subsidiary: Manchester Jetline Ltd. Associates: Tees Storage Company Ltd; Wymondham Oil Storage Company Ltd. GATX is BS 5750 part 2/ISO 9002 accredited.

Avonmouth, Bristol: Thirty-six tanks with a total capacity of 83,369 cubic metres, from 1,246 to 6,924 cubic metres in size, for high- and low-flash petroleum products and chemicals. Dock facilities comprise seven berths at the Royal Edward Dock (depth 9.8 metres, maximum length 210 metres, maximum beam 29 metres), five piggyback docklines (three 10-inch lines, one 24-inch line and one 8-inch stainless steel line). Distribution is through fully automated top and bottom road loading facilities. Wensat pipeline connection. Easy access to M4 and M5 motorways.

Belfast: Thirty-eight tanks with a total capacity of 50,116 cubic metres from 498 metres to 5,000 cubic metres in size for high- and low flash petroleum products and chemicals. A new jetty capable of handling vessels with 18,000-tonne cargoes is now operational (overall length 150 metres, maximum beam 29 metres and depth 9.5 metres). There are two 8-inch stainless steel and one 6-inch mild dockline. All docklines are piggyback. Distribution through fully automated top and bottom loading facilities. Easy access to M1 and M2 motorways.

Eastham, Merseyside: Site 1: Seventy-eight tanks with a total capacity of 261,988 cubic metres in tanks ranging from 35 to 10,800 cubic metres in size, suitable for high- and low-flash petroleum, lubricating oils and chemical products. Mild and stainless steel tankage, with and without coils and lagging. There are seven piggyback docklines (two 6-inch stainless steel lines, one 10-inch stainless steel line, one 10-inch mild steel line, two 12-inch and one 14-inch).

Site 2: Eighty-five tanks with a total capacity of 91,407 cubic metres in tanks ranging from 30 to 3,950 cubic metres in size, suitable for high- and low-flash petroleum, lubricating oils and chemical products. Mild and stainless steel tankage, with and without coils and lagging. There are 12 shipping lines on site (seven mild steel and five stainless steel, ranging from 6- to 10-inch). There is also a semi-automatic drum filling facility.

Dock facilities consist of three berths in the QEII Dock (depth 10.1 metres, length 204 metres, beam 27.4 metres) and one berth bank of the Manchester Ship Canal for high-flash product. Both sites are capable of receiving and redelivering product by road, rail, barge and sea vessel. Easy access to M53, M56, and M6 motorways.

Grays, Essex: Fifty-two tanks ranging in size from 1,700 to 20,800 cubic metres capacity and providing a total capacity of 310,749 cubic metres for high and low flash petroleum products. There are two jetties (Wouldham Nos. 1 and 2, draught 11.3 metres, length 229 metres and unrestricted beam) with five piggyback docklines (three 10-inch, one 12-inch and one 14-inch). Distribution through fully automated top and bottom road loading facilities. Easy access to M25 motorways.

Runcorn, Cheshire: Four tanks with a total capacity of 40,000 product tonnes for heated liquid sulfur. Dock facilities comprise one berth on the Manchester Ship Canal. Distribution is through road loading on two automatic weighbridges. Easy access to M53, M56 and M6 motorways.

Leith, Scotland: Thirty-four tanks with a total capacity of 72,902 cubic metres in tankage ranging from 55 to 13,400 cubic metres

capacity in size for both high- and low-flash petroleum and chemical product. Dock facilities comprise one berth (maximum length 198 metres, maximum beam 30.5 metres, draught 9.5 metres). There are two new 10-inch mild steel petroleum docklines and two stainless steel docklines. Road loading is being upgraded to allow fully automated top and bottom loading facility. Access to M8, M9 and M90 motorways.

Glasgow, Scotland: This new GATX site opened on 1 June 1996. GATX Glasgow has 16 tanks for high- and low-flash products and a total capacity of 54,685 cubic metres which is distributed through fully automated top and bottom loading facilities. There is one jetty with draught 11.9 metres, length 200 metres and an unrestricted beam, and there are six wet docklines dedicated to each product. Easy access to M8, and A8.

Wymondham, Norfolk: Joint venture between Mobil Oil and GATX Terminals Ltd. Eight tanks with a total capacity of 39,200 cubic metres ranging in size from 4,100 to 5,200 cubic metres. This terminal is pipeline fed and stores high- and low-flash petroleum products on a comingled basis. Distribution through fully automated road loading facilities. Easy access to A11.

Manchester Jetline Ltd: Joint venture between GATX Terminals Ltd and Penspen Engineering Consultants. The MJL pipeline system allows jet fuel to be transported to Manchester Airport. Operation commenced at the beginning of 1994. The system is such that most UK refineries could pump fuel to Manchester Airport if required.

Great Marsh LTD

Eling Terminal, Totton, Southampton SO40 9TN, UK
Tel: +44 (0)1703 663444 Fax: +44 (0)1703 873429

Managing Director: Dr H A Pearce Commercial Manager: Mr H Leoni
Great Marsh Ltd is the premier chemical and oil services facility in the South of England. Located within the Port of Southampton and close to the rapidly expanding Southampton Container Terminal, Great Marsh's broad range of expertise, services and flexibility make it the ideal strategic partner in the fast growing field of domestic and international chemical and oil supply chain management. Services include liquid bulk storage, warehousing, powder repacking, drum/IBC filling and blending.

Most specialised chemical and oil bulk storage requirements can be readily accommodated within Great Marsh Ltd's diverse tank farm. Over 125 stainless steel, mild steel or epoxy lined tanks from 55 to 7,000 cubic metres capacity are available. A number of tanks are also insulated and heated, and others are fully equipped to store low flash products. Materials routinely handled include crude oil, chemicals, solvents, bitumen and fuel oils. The bulk storage of hazardous materials is a particular speciality.

A comprehensive blending service fully integrated into the bulk storage facility is also operated. Cold or warm (to approximately 100°C), aqueous or solvent blends from 5 to 35 tonnes can be manufactured supported by Great Marsh Ltd's laboratory facility. Drum filling services (including low-flash and hazardous products), are provided by two drumming lines allowing filling directly from roadcars or, if required from bulk storage tanks. Extensive storage for hazardous and non-hazardous goods, and packaged waste is available in the site's covered and duth barn warehousing. Powder handling service include bag filling from up to 1 tonne flexible IBC to 25kg sacks and vice versa, as well as dry storage. The site operates on a 24-hour, 7 day/week basis and has its own wharf able to receive vessels up to 2,000 tonnes of high- or low-flash product. The site has good road access and is less than a mile from the motorway network.

The terminal is approved to BS EN ISO 9002:1994, and holds a comprehensive Waste Transfer Licence, a Petroleum Licence and is a Customs & Excise Bonded Warehouse.

Bulk Storage Survey

Haltermann GMBH

Head Office: Ferdinandstraße 55/57, 20095 Hamburg, Germany
Tel: +49 40 33318-403 Telex: 2161815 Fax: +49 40 33318-214
Operates four terminals in Europe.

Hamburg-Wilhelmsburg: Total capacity of 120,000 cubic metres, with tanks varying in size from 50 to 5,000 cubic metres, for all vegetable oils, petroleum product, solvents and chemicals. Some tanks are heating-coiled and insulated. Drumming and blending facilities are available. Access for ships, barges, road and rail tank cars and liner trains; two berths including a 33ft draught jetty.

Haltermann NV (Belgium): Ketenislaan 3, B-2748 Beveren/Kallo Linker Oever
Tel: +32 3 750 02 11 Telex: 33705 Fax: +32 3 775 02 61

All petroleum products, solvents, chemicals and vegetable oils can be stored in this 60,000 cubic metre capacity terminal. Tanks vary in size from 300 to 3,000 cubic metres. Some are stainless steel and coated with heating coils and insulation. Drumming and blending facilities are available, as is an associated custom processing plant. Access by road, rail and sea for vessels up to 28ft draught.

Haltermann A/S (Denmark): Søndre Møllevej, DK-4600 Køge (near Copenhagen)
Tel: +53 653370 Telex: 43565 Fax: +53 657009

Tanks ranging in capacity from 20 to 4,000 cubic metres make up this 15,000 cubic metres capacity facility. All petroleum products, solvents and chemicals can be stored. Some tanks heating-coiled and insulated; drumming facilities. Distribution by road, rail and sea, with berths for 12,000 tonnes dwt tankers.

Haltermann A/S (Sweden): Petroleumgatan 5, S-21124 Malmö
Tel: +40 181220 Telex: 32544 Fax: +40 938485

This 20,000 cubic metre capacity terminal has tanks ranging in size from 20 to 2,000 cubic metres for all petroleum products, solvents and chemicals. Some tanks are stainless steel, coated, heating-coiled and insulated. Distribution by road, rail and sea.

The details printed have not been updated from last year due to Petroleum Review being unable to contact the company.

The Independent Tank Storage Association (ITSA)

Executive Secretary: J G Wort FlintPet, 58 Harnham Road, Salisbury, Wiltshire SP2 8JJ, UK

Tel: +44 (0)1722 415572 Fax: (0900-1800hrs) +44 (0)1722 415572

The Association provides information and advice to government and other regulatory bodies in connection with the practical, safety and environmental health aspects of the bulk liquid storage industry. Membership is open to all companies operating in the UK whose main business is the storage of bulk liquids for third parties. A minimum capacity of 50,000 cubic metres is usually required for membership, but companies with lesser capacity may be invited to join. ITSA is a founder member of the European Tank Storage Associations (ETSA) which represents the industry and its particular characteristics in discussions with the European Commission (EC) on developing legislation.

IBL Bulk Liquids

Lime Street, Hull HU8 7AS, UK

Tel: +44 (0)1482 320736 Fax: +44 (0)1482 226162

132 storage tanks ranging from 50 to 830 cubic metres with a total capacity of 25,000 cubic metres. Specialises in the storage of non-hazardous chemicals, lubricating oils, lubricating oil additives and vegetable oils. The wharves are situated on the Hull River at Hull Forge Wharf and at 50-52 Lime Street, Hull. Facilities for receiving ex-road tankers or containers and good access to main roads leading to

the M62 motorway. Steam heating, blending, packaging and vehicle steam cleaning facilities on site.

Alexandra Dock, Hull

First phase of new terminal now completed at East Quay, Alexandra Dock, Hull. Tanks from 600 to 1,760 cubic metres with a current capacity approaching 12,000 cubic metres. Heated coated and insulated tanks suitable for import and export cargoes with dedicated pipelines to ensure product integrity. Priority berthing for vessels up to approximately 7,500 dwt. Steam heating, blending, drying and undercover vehicle loading facilities are all available on site. Additional land is available to accommodate further expansion.

King's Lynn Storage LTD

Head Office: PO Box No 2, Melton Constable, Norfolk NR 24 2QR, UK

Tel: +44 (0)1263 860812 Fax: +44 (0)1263 861491

Terminal: Estuary Road, King's Lynn, Norfolk PE30 2HH, UK

Tel: +44 (0)1553 764382 Telex: 817018 Fax: +44 (0)1553 767942

The activities of King's Lynn Storage are twofold: 1. Having sold its main storage terminal to its principal customer, Kuwait Petroleum (GB) Ltd, it manages the 15,000 cubic metres terminal on behalf of KPGB. 2. King's Lynn Storage Ltd operates another terminal comprising 10 storage tanks ranging from 55 cubic metres to 2,200 cubic metres with a total capacity of 4,000 cubic metres. It is served from Bentinck Dock, King's Lynn, where KLS has access to three berths by agreement with Associated British Ports. The port can accommodate vessels up to 3,000 tonnes dwt. One 6-inch fully pigged product line leads from the berths to the terminal which is approved for the storage of petroleum products and chemicals. There are facilities for the discrete delivery of all products to road tank wagons. Office and warehouse space is available to meet customers' requirements.

La Petrolifera Italo Rumena SPA

Head Office: 40136 Bologna, Viale Aldini 190, Italy

Tel: +39 51 331567 Telex: 511549 Fax: +39 51 332451

Terminal: Via Bajona, 260 - Porto Corsini-Ravenna, Italy

Tel: +39 544 538497 Telex: 550122 Fax: +39 544 531535

Managing Director and General Manager, Guido Ottolenghi; Terminal Services Marketing Manager, Giordano Calore.

Total storage capacity for petrochemicals and bulk liquids of 80,000 cubic metres. Has 57 tanks ranging from 250 to 5,000 cubic metres for high- and low-flash products. Some tanks in stainless steel, some rubber or specially coated; nitrogen blanketing facilities; hot water



La Petrolifera Italo Rumena

system for accurate temperature control. Each tank has its own pump and line to loading racks and its own loading point to avoid any risk of mixing or contamination. Two vessel berths, both of which can accommodate vessels up to 180 metres in length and up to 8.5 metres (28 ft) draught. Sixteen pipelines, between 6-inches and 12-inches diameter (some insulated and of stainless steel) from berths to the storage tanks. Dredging operations are in progress to increase draft from present 28 ft to 32 ft - expected completion September 1998.

LBC (group Fimalac)

Storage of liquid products: LBC disposes of more than 1 million cubic metres of liquid storage spread over four European countries; Belgium, France, Portugal and Spain.

Warehousing: in France for hazardous, in Belgium for non-hazardous goods. All terminals are ISO 9002 qualified.

Belgium

LBC Antwerpen

Haven 275, Leon Bonnetweg 28, B-2030, Antwerpen

Contact: Raymond Moré/Paul Flameng

Tel: +32 3 543 0505 Fax: +32 3 543 0501

Storage: 185,000 cubic metres. Tanks: from 120 to 3,300 cubic metres. mild steel, stainless steel and coated. Products: all chemicals, mineral and vegetable oils, oil additives and bitumen. Handlings: heating, blanketing, filtering and drumming. Accessibility: rail, road and sea; 568 metres of quay with safety draught of 10.96 metres (36ft).

France

LBC Marseille - FOS

Route de Port Pétrolier, 13117 Lavera, France

Contact: Alain Sizac

Tel: +33 4 42 44 4244 Fax: +33 4 42 44 4220

Storage: 183,000 cubic metres. Tanks: from 120 to 10,000 cubic metres, mild steel, stainless steel and coated. Products: all chemicals, mineral oils, oil additives. Handlings: heating, blanketing, filtering and drumming. Accessibility: rail, road and sea; two quays with a draught of 11.88 metres (39ft).

LBC Nantes

103, quai Emile Cormerais BP 53, 44801 Saint Herblain, Cédex France

Contact: Yves Galindo

Tel: +33 2 40 46 26 48 Fax: +33 2 35 25 86 21

Storage: 32,000 cubic metres. Tanks: from 50 to 1,750 cubic metres, mild steel, stainless steel and coated. Products: chemicals, animal fats, vegetable oils, molasses and bitumen. Handlings: heating, blending, filtering and drumming. Accessibility: rail, road and sea; two jetties with a draught of 9.5 metres (31 ft).

Sogestrol

Route de la Chimie, BP 1194, 76064 Le Havre, Cédex, France

Contact: Christian Vermillon/François Bertrand

Tel: +33 2 35 25 86 20 Fax: +33 2 35 25 86 21

Storage: 360,000 cubic metres. Tanks: from 50 to 15,000 cubic metres, mild steel, stainless steel and coated. Products: all chemicals. Handlings: heating, blanketing, binding, filtering and drumming. Accessibility: rail, road and sea; six jetties up to 40,000 tonnes.

LBC Le Havre

Chaussée Roger Meunier, 76600 Le Havre, France

Contact: Pierre Jeanne

Tel: +33 2 35 42 22 62 Fax: +33 2 35 42 47 49

Storage: 105,000 cubic metres. Tanks: from 135 to 5,080 cubic metres, mild steel, stainless steel and coated. Products: all products with flashpoint above 100°C, chemicals, animal fats, vegetable oils and molasses. Handlings: heating, blanketing, blending, filtering and drumming, dehydrating. Accessibility: rail, road and sea; three jetties with a draught of 14 metres (46 ft).

LBC Bayonne

Zone Industrielle, Route de la Barre, 40220 Tarnos, France

Contact: Philippe Ivandekic

Tel: +33 5 59 64 4800 Fax: +33 5 59 64 4801

Storage: 101,000 cubic metres. Tanks: from 600 to 15,000 cubic metres, mild steel, stainless steel and coated. Products: all chemicals, gasoil and crude. Handlings: heating, blanketing, blending, filtering and drumming. Accessibility: rail, road and sea; two berths with a draught of 8.7 metres (28.5 ft).

Portugal

Tanquipoir Lisbon

Parque Industrial do Barreiro, 2830 Barreiro (Lisboa), Portugal

Contact: Marius França Pereira

Tel: +351 1 206 03 48 Fax: +351 1 207 85 77

Storage: 90,000 cubic metres. Tanks: from 800 to 30,000 cubic metres, mild steel and coated. Products: chemicals, mineral oils, gasoil and gasoline. Handlings: heating, blanketing, blending, filtering and drumming. Accessibility: rail, road and sea; private jetty with a draught of 9.7 metres (32 ft).

Spain

LBC Terquiza

Polígono Central de Raos, E-39011 Santander, Spain

Contact: Fernando Lopez de Pablo

Tel: +34 42 34 3634 Fax: +34 42 33 3804

Head Office: Sta Cruz de Marcenado 31, E-28015, Madrid.

Tel: (34) 1 547 3027 Fax: (34) 1 542 1391

Storage: 65,000 cubic metres. Tanks: from 50 to 2,500 cubic metres, mild steel and coated. Products: petroleum and chemicals. Handlings: heating, blanketing and blending. Accessibility: rail, road and sea; private jetty with a draught of 12.2 metres (40 ft).

LBC Terlik

Polígono el Fangal, Valle de Escombreras, 30201 Cartagena (Murcia) Spain

Contact: Fernando Lopez de Pablo

Tel: +34 9 1 547 39 68 Fax: +34 9 1 542 13 91

Storage: 20,000 cubic metres. Tanks: from 1,500 to 3,500 cubic metres, stainless steel, mild steel and coated. Products: all chemicals and petroleum products. Handlings: heating, blanketing, filtering. Accessibility: road and sea, 2 jetties with a draft of 38 ft.

National Gas (Liquefied Petroleum National Gas Ltd)

A division of Calor Gas Ltd

Canvey Terminal, Canvey Island, Essex S58 OHR, UK

Tel: +44 (0)1268 511511 Fax: +44 (0)1268 694011

Head Office: Calor Gas Ltd, Athena Drive, Tachbrook Park, Warwickshire, CV34 6RL, UK

Tel: +44 (0)1926 330088 Fax: +44 (0)1926 318989

National Gas is the operator of the largest fully refrigerated LPG distribution terminal in the UK, which will be commissioned in September 1997. Situated at Canvey Island, the terminal has six aluminium alloy and two low carbon steel tanks with a total capacity of 40,000 tonnes. The single jetty is capable of handling vessels of up to 280 metres length overall with a minimum of 11 metres of water available at low tide. The facility is designed principally to store fully refrigerated propane although butane can be accommodated in the two low carbon steel tanks. Inland distribution is via road tanker loading racks, although smaller LPG carriers can be loaded alongside the jetty. The site has its own laboratory, workshops, and weighbridge and will have fully computerised stock accounting. Calor Gas Ltd purchased Liquefied Petroleum National Gas Ltd (LPNG Ltd), including its Canvey Island terminal, on 20 February 1998.

Noord Natie Terminals nv

Stadsdwaag 7-8, B-2000 Antwerp, Belgium

Tel: +32 3 232 99 40 Telex: 31677 Fax: +32 3 233 39 36

Situated in the port of Antwerp. There are 189 tanks ranging from 30 to 8,300 cubic metres, with a total capacity of 225,000 cubic metres for vegetable oils,

Bulk Storage Survey



Noord Natie terminal

animal fats, oleochemicals, chemicals and mineral oils. Tanks are or can be equipped with heating coils, insulation and nitrogen blanketing facilities. Three mooring berths for seagoing vessels and a special dock for handling barges. Direct road and railway connections. Weighbridges up to 100 tonnes.

Oikos Storage LTD

Hole Haven Wharf, Canvey Island, Essex SS8 0NR, UK
Managing Director, G W Booker; Finance Director, K D Hollocks;
Operations Manager, T R Dent.
Tel: +44 (0)1268 682206 Fax: +44 (0)1268 510095
e-mail: Oikos@netcomuk.co.uk

Oikos operates Hole Haven Wharf, the most seaward liquid bulk storage installation in the Port of London. The terminal is connected to the UK oil pipeline networks (UKOP and GPSS), and is capable of delivering product throughout the UK including the three major airports - Heathrow, Gatwick and Stansted.

The installation has a capacity of 300,000 cubic metres with a variety of tankage, ranging from 50 to 20,000 cubic metres including coiled, lagged and lined tanks. The site is fully licensed by the EA to receive, store, transfer, and treat waste products.

Three jetties, capable of handling vessels up to 220 metres length overall with a minimum depth at low water of 10 metres, are connected to the installation by 20 lines including stainless steel, lagged and traced.

Oiltanking GMBH

Admiralitätsstraße 55, D-20459, Hamburg, Germany
Tel: +49 40 370990 Fax: +49 40 37 099199

Worldwide, Oiltanking has a storage capacity of 7.3 million cubic metres cubic metres. At the moment the company operates nine deep-water terminals, all designed for fast and efficient handling. These deep water terminals are situated in Amsterdam, Bahia Blanca (Argentina), Beaumont (US), Copenhagen, Ghent, Hamburg, Houston, Malta and Singapore. A new terminal will be added to this list in the third quarter of 1998 when the first phase (195,000 cubic metres) of Indian Oiltanking's Mumbai terminal will be commissioned.

All these deepwater terminals take up key positions in the international oil storage business. In northwest Europe they are backed by a vast network of German inland terminals and an inland terminal in France (Annay). In the third quarter of 1997 the terminal system in Germany was improved by increasing the storage capacity in Hamburg by 426,000 cubic metres and the addition of a terminal (20,000 cubic metres) in Chemnitz (former east Germany). The combination of deep-

water and inland terminals gives room to a wide variety of solutions to match individual needs.

The Amsterdam terminal plays an important role in the distribution of high and low flash-point products in northwest Europe and the UK. Vessels up to 85,000 dwt are handled at this terminal and their cargoes redistributed on coasters and barges. Extensive product treatment facilities for the blending, leading, upgrading and downgrading of products are also available. As of the last quarter of 1998 Oiltanking Amsterdam will handle Jet fuel for Amsterdam Airport (Schiphol) through its new pipeline connection. Oiltanking Copenhagen and Oiltanking Ghent have similar contracts to deliver Jet fuel to airports in their region through pipeline connections.

The Malta facility is the first public terminal to be located so near to the primary trade route between the Suez canal and Gibraltar. Thereby it is connected to ports in Europe, the Middle East, Africa, the US and the Black Sea region. The Oiltanking Malta terminal is located at the Malta Freeport, so in-route products can be shipped in, stored, blended and shipped out duty free.

Germany:

Bendorf has a total storage capacity of 145,000 cubic metres in 22 tanks varying in size from 2,000 to 20,000 cubic metres. The terminal can accommodate low and high flash-point petroleum products and can handle barges, railcars and trucks.

Berlin has a total storage capacity of 349,000 cubic metres in 30 tanks varying in size from 1,600 to 25,000 cubic metres. At the terminal low and high flash-point petroleum products can be stored and it can handle barges, railcars and trucks.

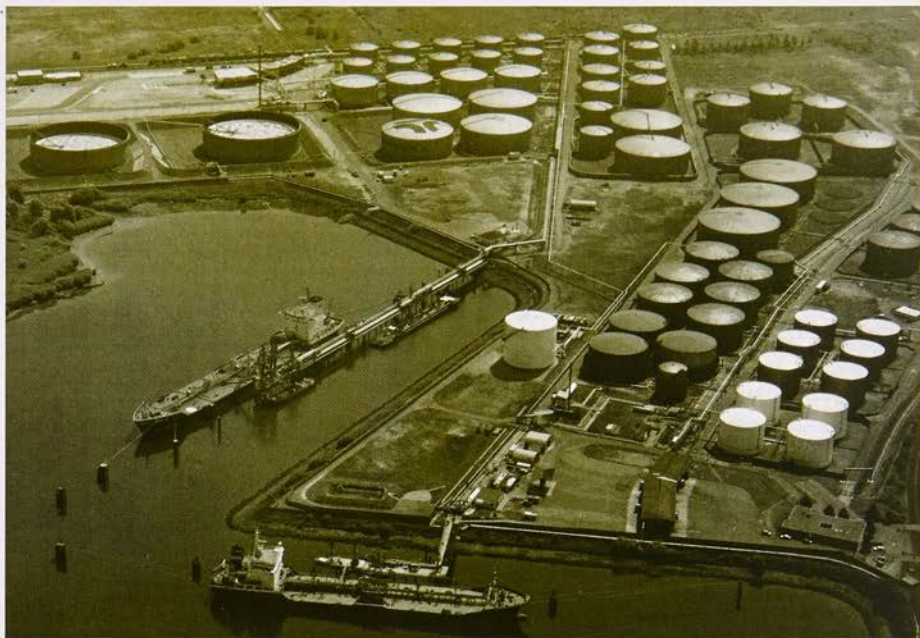
Bremen has a total storage capacity of 60,000 cubic metres in two tanks from 20,000 cubic metres and 40,000 cubic metres. The terminal can accommodate low flash-point petroleum products and can handle vessels (up to 30,000 dwt) and barges, and has a pipeline connection.

Chemnitz has a total capacity of 20,000 cubic metres in one tank. The terminal accommodates low-flash petroleum products and can handle railcars and trucks.

Duisburg has a total storage capacity of 35,000 cubic metres in six tanks varying in size from 5,000 to 10,000 cubic metres. The terminal can accommodate low and high flash-point petroleum products and can handle barges, and trucks.

Frankfurt has a total storage capacity of 50,000 cubic metres in 25 tanks varying in sizes from 95 to 5,000 cubic metres. The storage facility can accommodate low and high flash-point petroleum products and chemicals. The terminal can handle barges, and trucks.

Gera has a total storage capacity of 158,600 cubic metres in nine tanks varying from 8,600 to 25,000 cubic metres. The terminal can accommo-



Oil tanking terminal

date low and high flash-point petroleum products and can handle railcars and trucks.

Hamburg has a total storage capacity of 1,026,000 cubic metres in 86 tanks varying in size from 2,500 to 50,000 cubic metres. The terminal can accommodate low and high flash-point petroleum products, and can handle vessels (up to 85,000 dwt), barges, railcars and trucks.

Hamm has a total storage capacity of 76,100 cubic metres in eight tanks varying in sizes from 3,000 to 15,000 cubic metres. The terminal can accommodate low and high flash-point petroleum products and can handle barges, railcars and trucks.

Honau has a total storage capacity of 115,000 cubic metres in 11 tanks varying in size from 5,000 to 20,000 cubic metres. The storage facility can accommodate low and high flash-point petroleum products. The terminal can handle barges and trucks and has access to the CEPS pipeline network.

Karlsruhe has a total storage capacity of 161,000 cubic metres in 39 tanks varying in sizes from 600 to 20,000 cubic metres. The terminal can accommodate low and high flash-point petroleum products and it can handle barges, railcars and trucks.

The Netherlands

Amsterdam has a total storage capacity of 800,000 cubic metres in 53 tanks varying in size from 690 to 40,000 cubic metres. The storage facility can accommodate low and high flash-point petroleum products, heavy fuel oil, crude oil, components, feedstocks and molasses. The terminal can handle vessels (up to 85,000 dwt) and barges, and is accessible through pipelines.

Belgium

Ghent has a total storage capacity of 700,000 cubic metres in 62 tanks varying in size from 800 to 47,500 cubic metres. The storage facility can

accommodate low and high flash-point petroleum products, feedstocks, chemical products, fertilisers and edible oils. The terminal can handle vessels (up to 65,000 dwt), barges, railcars, trucks and is connected to the CEPS pipeline network.

France

Annay has a total storage capacity of 58,000 cubic metres in 12 tanks varying in size from 1,000 to 15,000 cubic metres. The storage facility can accommodate low and high flash-point petroleum products and chemicals. The terminal can handle barges and trucks.

Denmark

Copenhagen has a total capacity of 339,500 cubic metres in 39 tanks varying in size from 1,600 to 16,500 cubic metres. The storage facility can accommodate low and high flash-point petroleum products, heavy fuel oil and slop-oil. The terminal can handle vessels (up to 40,000 dwt) and trucks.

Malta

Malta has a total capacity of 359,000 cubic metres in eighteen tanks varying in size from 500 to 35,000 cubic metres. The storage facility can accommodate low and high flash-point petroleum products, components and feedstocks. The terminal can handle vessels (up to 120,000 dwt) and barges.

Omni Tank GMBH

Marienstraße 20, 40212 Düsseldorf, Germany

Managing Director, Mr Peter Hueck; Sales Manager, Mr Wolfgang Lupke

Tel: +49 211 93699-0 Fax: +49 211 93699-30

e-mail: OmniTank@t-online.de

Breisach: 23,400 cubic metres; 15 tanks ranging from 100 to 5,000

Bulk Storage Survey

cubic metres for storing petroleum product. Access for barges and road tank cars.

Essen: 112,000 cubic metres; 39 tanks ranging from 600 to 12,000 cubic metres for petroleum products, chemical and petrochemical liquids and solvents. Insulated, coiled and coated tanks are available and equipped with dedicated pipelines, heating and blending facilities. Access by road, rail and barge.

Hanau: 48,000 cubic metres; 23 tanks ranging from 360 to 3,750 cubic metres for gasoline, gas oil, jet fuel and petrochemical liquids. Blending facilities are available. Access by road, rail and barge.

Karlsruhe: 51,000 cubic metres; 19 tanks ranging from 650 to 3,000 cubic metres for petroleum product and petrochemical liquids. Access by road and rail tank cars (liner trains) and barges.

Speyer: 796,000 cubic metres; 57 tanks ranging from 2,000 to 60,000 cubic metres for all petroleum products, chemicals and petrochemical liquids, liquefied gases and solvents. Blending facilities are available. Access by road, rail (liner trains), barge and pipeline (CEPS).

Paktank Oil Nederland bv

Oude Maasweg 6 (portnumber 4040), 3197 KJ Botlek-Rotterdam, The Netherlands

PO Box 5010, 3197 XC Botlek-Rotterdam, The Netherlands.

Commercial enquiries: F R Ploeg, Vice-President, Petroleum Products and Crude Oil Storage Plus

Tel: +31 10 295 3405 Fax: +31 10 438 7390 e-mail: FPLOEG@PAKHOED.COM
Paktank Oil Nederland bv operates bulk liquid terminals in the Netherlands.

Netherlands: Botlek, Rotterdam: 1,549,000 cubic metres capacity of which 550,000 cubic metres is used for chemicals; access by sea, rail, road and pipelines. Pipeline connections to domestic refineries, chemical plants, national and international pipeline systems and to Paktank's other terminals in the Rotterdam area; draught sea berths: 39'6"; storage for petroleum product, chemicals and specialised liquids; distillation facilities through Pakhoed Products International; multi-purpose distillation columns for mineral oils and chemicals.

Maasvlakte, Rotterdam: 720,000 cubic metres capacity for crude oil; access by sea and pipelines; draught sea berths 72'.

Laurenshaven, Rotterdam: 926,000 cubic metres capacity for petroleum product; access by river and pipelines.

Europoort, Rotterdam: 1,973,000 cubic metres capacity for crude oils and petroleum product; access by sea, river and pipelines; draught sea berths 68'.

Paktank International bv

Blaak 333, 3011 GB Rotterdam, The Netherlands

PO Box 863, 3000 AW Rotterdam, The Netherlands

Tel: +31 010 400 2380 Fax: +31 010 213 0062

Through its range of operating companies, Paktank, a wholly owned subsidiary of Royal Pakhoed, provides worldwide storage capacity of approximately 16 million cubic metres (100 million barrels, including the share of joint venture partners), handling millions of tonnes of oil and chemicals each year. Paktank International bv operates bulk liquid terminals in Scandinavia, Estonia, Germany, Tunisia, Singapore, Thailand, China and Pakistan for crude oil, petroleum products and chemicals.

Sweden, Gothenburg: 75,000 cubic metres capacity for petroleum product and chemicals; access by sea, rail, road and pipeline; draught sea berths 36' for petroleum products and 26'1 for chemicals.

Gothenburg: Cleaning stations for tank containers.

Södertälje: 118,000 cubic metres capacity for petroleum product, chemicals and bitumen; access by sea, rail and road; draught sea berths 32'8 (present channel approach 29'5).

Malmö: 24,000 cubic metres capacity for petroleum product, chemicals and bitumen; access by sea, rail and road; draught sea berths 37'7".

Stenungsund: Cleaning stations for tank containers.

Estonia, Tallinn: 196,000 cubic metres for petroleum product; access by sea, road and rail; draught sea berths 33'.

Germany, Hamburg: 128,000 cubic metres for petroleum product; access by sea, river, road, rail and pipeline; pipeline connected to neighbouring terminals and refinery; draught sea berths 43'.

Propetrol

Head Office: 65 Quai Jacoutot, BP 13, 67015 Strasbourg Cedex, France

Tel: +33 388 45 90 10 Telex: 880078 Fax: +33 388 45 90 20

Contact: Petroleum Storage, Yvan Pierre Debard; Chemical Storage, Evelyne Nichts

Propetrol, a subsidiary of the Petrofrance group of companies, is an independent petroleum and chemical storage company with terminals in:

Strasbourg: on the Rhine river: 144,000 cubic metres 46 tanks (4 stainless steel) ranging from 300 to 20,000 cubic metres, for petroleum products, chemicals and petrochemicals, and industrial wastes. Access by truck, rail and barge. Pipeline connection to refinery. Services: denaturing, heating and insulated tanks and pipes, dedicated systems, weighing, nitrogen blanketing, etc.

Village Neuf: on the Rhine river: 62,000 cubic metres

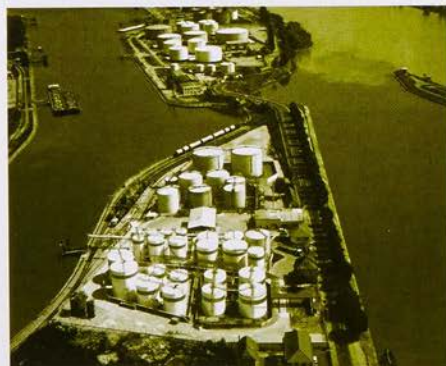
Ten tanks ranging from 4,000 to 10,000 cubic metres, for petroleum products. Access by truck, rail and barge. Services: denaturing and dedicated systems.

Villeneuve la Garenne: on the Seine river: 17,000 cubic metres + 6,500 square metres

59 tanks (2 stainless steel), ranging from 90 to 630 cubic metres, for chemicals, petrochemicals and industrial wastes. Access by truck, rail and barge. Services: heating and insulated tanks, dedicated systems, weighing, nitrogen blanketing, etc. Four warehouses for the storage of drummed and packaged chemicals. One drumming facility.

Gergy: on the Saône river, 120 km north of Lyon: 18,000 cubic metres Nine tanks for petroleum products. Access by truck and barge. Services: denaturing and dedicated systems.

Salaise sur Sanne: on the Rhône river, 60 km south of Lyon: 16,000 cubic metres (of which 9,000 cubic metres commissioned in July 1998). 15 tanks (7 stainless steel), ranging from 400 to 1,650 cubic metres, for chemicals and petrochemicals. Access by truck, rail and barge. Services: heating and insulated tanks and pipes, dedicated systems, weighing, nitrogen blanketing, recirculating systems.



Propetrol terminal

Propetrol has two sister storage companies also affiliated to Petrofrance:
Tepsa (Terminales Portuarias) in Spain: terminal in Barcelona, Valencia, Tarragona and Bilbao, for chemicals and petroleum products.
Adriatic in Italy: terminal in Ravenna, for chemicals and edible oils.

Pusback u. Morgenstern Petrotank

Neutrale Tanklager-GmbH & Co. KG, Barkhausenstraße. 35-43 D-27568 Bremerhaven, Germany

Tel: +49 471 9 46900 Fax: +49 471 9 4690-90 Web site: www.petrotank.de
 Petrotank is an independent company in northern Germany, which owns and operates storage installations at Bremen, Bremerhaven, Nordenham-Blexen, Oldenburg (river Weser), Hannover, Hildesheim, Braunschweig (Mittelland-Kanal) and Trier (river Mosel). Total capacity is about 202,400 cubic metres. Seagoing vessels are possible at: Nordenham-Blexen, draught maximum 32ft, length overall 170m; Bremen, draught maximum 31ft, length overall 150 metres.

There are barge, rail and truck facilities available in the other terminals. Storage of heavy fuels, gas oil, urea and other liquid products.

Petrotank also carries out disposals of oily ship residues in accordance with the Marpol agreement on the river Weser at the ports of Bremerhaven, Brake and Bremen by the barges *Wesertank 22*, *Wesertank 23*, *Grautank 2* and a tanker.

Ross Chemical & Storage Co LTD

Grange Dock, Grangemouth, Scotland FK3 8UD, UK

Tel: +44 (0)1324 474774 Fax: +44 (0)1324 485476

One of the largest independent bulk liquid storage facilities located in Scotland's premier port of Grangemouth.

Replenishment: Common user jetty for ships of up to 20,000 dwt. The terminal is serviced by 10 shore lines (6" and 8" diameter) with a maximum back pressure of 100psi. Dedicated pipelines are available if required and line purging is undertaken using nitrogen. Shipping is worked on arrival 365 days a year.

Tankage: The facility comprises 44 tanks including both mild and stainless steel ranging from 800 cubic metres to 2,650 cubic metres with a total capacity of 72,000 cubic metres. Heated storage is also available. Bonded status is available subject to HMCE consent.

Vehicle loading: State of the art vehicle loading rack comprising five bottom loading and two top loading racks. Loading rates are 2,100 litres per minute (bottom) and 1,200 litres per minute (top). The driver controlled loading operation (which includes secure card controlled entry and loading) is fully computerised and includes integrated earthing and overspill protection. Automated inline additive injection equipment is fitted to the Mogas bays. Road loading operations are available 24 hours a day, 7 days a week.

Vapour recovery: The terminal meets EU Environmental legislation effective after 31 December 1998.

Simon Storage Group LTD

Priory House, 60 Station Road, Redhill, Surrey RH1 1PE, UK

Tel: +44 (0)1737 778108 Telex: 58218 SSSOR G Fax: +44 (0)1737 778112

Simon Storage manages storage investments in the UK and Eire for Simon Group plc. With the exception of the Seal Sands terminal these are in joint venture with Koninklijke Van Ommen NV.

Simon Management: Simon Storage also provides comprehensive facilities management services for the oil industry including aviation in plane services, terminal, oil and gas pipeline management, and onshore oilfield operation.

Cumbria Terminal: Prince of Wales Dock, Workington, Cumbria

Tel: +44 (0)1900 605151 Telex: 64331 CSTORR G

Fax: +44 (0)1900 67986

31,581 cubic metres for petroleum products and chemical storage. Transport by road, rail and sea. Ships Agency: Workington - can handle 10,000 tonnes dwt vessels and provides excellent port facilities for

deliveries to or from northwest England and southern Scotland.

Immingham Terminals: Immingham Docks, Nr Grimsby, South Humberside

West: Tel: +44 (0)1469 572615 Telex: 52291 ISCOL G

Fax: +44 (0)1469 577019

East: Tel: +44 (0)1469 571241 Telex: 527931 ISCEA G

Fax: +44 (0)1469 41012

Simon Storage operates two installations at Immingham Docks (East and West). More than 300 tanks with a total capacity of 570,000 cubic metres, making it the largest independent bulk storage terminal in the UK. Included in this figure are pressure storage for gases, stainless steel, lined, lagged and steam heated tanks. More than 60 jetty lines, including six stainless steel, provide for excellent segregation of grades. Use is made of two jetties: Eastern and Western. The terminal is connected to the Humber refineries and chemical plants by pipelines. The jetties have 35ft draught and can accommodate up to 35,000 tonnes dwt tankers, coasters or barges. Transport by road, rail, sea and pipeline. The company has land available for expansion to meet customers' special requirements at Immingham. New tankage has recently been completed together with new road loading facilities designed to meet current and future volatile organic compounds legislation. A vapour recovery unit is to be installed.

Seal Sands Terminal: Seal Sands, Middlesbrough, Cleveland TS2 1UB UK

Tel: +44 (0)1642 546775 Telex: 58218 SSSOR G Fax: +44 (0)1642 546076

Over 100 tanks with a total capacity of 196,400 cubic metres for petroleum products, chemicals including molten sulfur, vinyl chloride monomer and LPGs and a wide range of edible or specialist products. Two jetties, one taking vessels up to 30,000 tonnes dwt. The terminal is connected to local chemical plants by pipeline. Transport by road, rail and sea. Block trains handled. Two new bottom loading facilities have been constructed for petroleum handling with further tankage planned. A vapour recovery unit is to be installed.

Shannon Terminal: Foynes Harbour, Foynes, Co. Limerick, Eire

Tel: +353 69 65506 Fax: +353 69 65601

One installation. 14,000 cubic metres for petroleum and chemical products on the River Shannon. The jetty can accommodate 20,000 tonne tankers and facilities are included for the loading to road tank wagons and the supply of product to barges at the jetty. Land available for expansion of the terminal.

Tyne Terminal: Northumberland Dock, North Shields, Tyne and Wear, NE29 6DY

Tel: +44 (0)191 296 0999 Telex: 53180 VELVA G Fax: +44 (0)191 258 6996

Total capacity 54,704 cubic metres. Fifty mild steel tanks, ranging in capacity from 300 to 8,600 cubic metres for chemicals, gasolines and oils. Blending facilities. Many tanks are cooled. Ethanol bonded storage available. Some tanks are coated with epoxy or phenolic resin-based paints. Additional land is available for further development and construction to suit particular client requirements. Access by sea and road. Three berths at North Shields provide for vessels up to 10 metres draught. There is rapid access to major road networks for road tankers. Licences to handle chemical wastes. New tankage under construction.

Tanklager-Gesellschaft Mannheim GMBH

Essener Str 64, D-68219 Mannheim, PO Box 81 04 06, D-68204 Mannheim, Germany

Tel: +49 621 89 98 5 Fax: +49 621 80 60 466

The Tanklager-Gesellschaft Hoyer, Mannheim, was founded in 1959 and operates large-scale, modern, independent tank depots at Mannheim-Rheinau and at Mannheim-Handelskai.

Mannheim, the second largest river port in Europe, lies in the heart of Germany - ideally situated for inland tank storage. Apart from the Rhein-Main area in south Germany, Mannheim allows economical access to eastern France and north Switzerland and since the opening of the

Bulk Storage Survey

Rhein-Main-Donau-Kanal also to the Donau and southeastern Europe.

Both the tank storage depots have access to waterways, rail terminals and the motorway network.

The tank storage depot at Mannheim-Rheinau has a total of 230,000 cubic metres tank space, and the storage depot at Mannheim-Handelshafen has over 78,000 cubic metres. The tank space of both of these can be extended by a further 50 to 80,000 cubic metres.

The capacity of the individual tanks is between 50 and 22,000 cubic metres.

Modern cargo handling areas with 8,000 square metres storage space at Mannheim-Handelshafen are particularly suitable for the storage and trans-shipment of bulk and intermediate bulk container packed chemicals and other goods. Large open-plan storage areas with ramp access are available for the storage of drums.

All tanks are equipped with a separate pipeline system, which ensures the independent treatment of each product to a high standard. Besides black steel tanks, the TLG storage depot at Mannheim-Handelshafen can also offer stainless steel tanks with a capacity of 10,600 cubic metres, tanks with special cladding, insulation and facilities for nitrogen supply.

In addition to expert storage of a wide variety of products, such as petrol, chemicals and solvents, high inflammable products, gasoline, aromatics, industrial alcohols, glycols, plasticisers, additives, acrylate, detergent products, vegetable oils, organic acids and resin dispersions, TLG offers all other services connected with handling and transportation: customs clearance, quality control, weight control, tank checking and drum filling.

Delivery and despatch can be made by ship, rail or road. TLG offers a complete rail service also for hazardous, poisonous and toxic commodities including direct trans-shipment rail/tank/ship.

Ever since the opening of the storage depots, special attention has been paid to safety aspects. The most modern facilities guarantee swift and safe trans-shipment.

The years of experience which the TLG team have in handling a variety of products, together with modern technology, ensures safety – safety for the products and safety for the environment.

Well trained staff deal with even the most unusual problems in a professional manner.

Tees Storage Company LTD

Seal Sands, Middlesbrough, Cleveland TS2 1UA, UK
Tel: +44 (0)1642 546767 Telex: 58477 Fax: +44 (0)1642 546222
Jointly owned by Royal Pakhoed and GATX Corporation. Operates a terminal at Seal Sands.

150 tanks from 55 to 8,500 cubic metres, with a total capacity of 230,000 cubic metres. Mild steel and stainless steel coated for petroleum and chemicals. One sphere of 6,650 cubic metres for vinyl chloride monomer. Road, sea and pipelines to neighbouring plants. Provision for rail. Drumming facilities. Three jetties for ships up to 40,000 dwt. Maximum length 760ft, maximum draught 36ft. 57 docklines (36 stainless steel).

Terminales Portuarias SA

Muelle de Inflamables, s/n, 08039 Barcelona, Spain
Tel: +34 3 223 52 02/223 52 22 Fax: +34 3 223 45 79

TEPSA is a joint venture with equal shares held by GATX Terminales Corporation and Petrofrance Chimie SA. It owns and operates liquid bulk chemical terminals in four major Spanish ports: Barcelona, Tarragona, Valencia and Bilbao.

Barcelona: 220 tanks with a total capacity of 198,362 cubic metres, from 50 to 15,430 cubic metres in size, for chemical products, oils, acids and petroleum product. There are four jetties (draught 39 ft). Access is by sea, rail and road. Services available: mild steel, stainless steel and coated tankage, tanks with internal floating screen, storage, loading, unloading of vessels, tank trucks and rail cars; weighing, drumming, trans-shipment facilities, refrigerating, nitrogen blanketing, blending and warehousing. Heating possibilities are steam with water and with oil. Tanks for chemical products are equipped with dedicated product lines and pumps.



Terminales Portuarias terminal

Tarragona: 37 tanks with a total capacity of 39,198 cubic metres from 650 to 3,850 cubic metres in size for chemical products, acids, oils and others (sosa oil, methanol, fertilisers). There are two jetties (draught 41ft). Access is by sea, rail and road. Services available: mild steel, stainless steel and coated tankage, storage, loading and unloading of vessels, tank-trucks and railcars, weighing and nitrogen blanketing. Heating possibilities are steam with warm water. Tanks for chemical products are equipped with dedicated product lines and pumps.

Valencia: 24 tanks (dedicated pumps and lines for each tank) with a total capacity of 36,765 cubic metres from 305 to 3,050 cubic metres in size, for chemical products, petroleum products, nitrogen fertilisers and oils. There is one jetty (draught 39ft). Access is by sea and road. Services available: mild steel tanks and some with internal floating screen, storage, loading and unloading of vessels and tank trucks, weighing, product heating and nitrogen blanketing. Tanks for chemical products are equipped with dedicated product-lines and pumps.

Bilbao: 41 tanks (dedicated pumps and lines for each tank) with a total capacity of 49,840 cubic metres from 460 to 5,650 cubic metres in size, for chemical products, petroleum products, acids and others. There are two jetties (draught 52ft). Access is by sea and road. Services available: mild steel tanks and some with internal floating screen, storage, loading and unloading of vessels and tank-trucks, weighing and product heating and nitrogen blanketing. Tanks for chemical products are equipped with dedicated product-lines and pumps.

TDG Pinnacle

Choats Road, Dagenham, Essex RM9 6PU, UK
Regional Director: Eric Allen, Terminal Manager: Denis O'Connor
Tel: +44 (0)181 593 7211 Fax: +44 (0)181 593 1632
Owned by Transport Development Group plc (TDG) and formerly known as London & Coastal Oil Wharves Ltd.

Dagenham terminal: Situated between London and Dartford River Crossing. The nearest major privately owned storage terminal on the Thames to London with direct access to the M25/M11/M1/M20/M2 road networks. The terminal operates 236 tanks with a total capacity of 115,000 cubic metres and these include mild, stainless steel and epoxy-lined tanks, suitable for storage of all chemicals, edible oils, lube oil and pharmaceutical products. The site is operated 24 hours a day at no extra charge.

Jetty facilities include 42 segregated jetty lines (pigged stainless and mild steel), and berthing facilities for vessels of up to 228 metres length overall and 40,000 tonnes dry weight with 10 metres of water at low tide.

Blending facilities for lubes, anti-freeze and other products are available and a recent investment in a computerised drumming facility guarantees containers are drummed off overnight.

The terminal has a modern workshop, weighbridge, radio communications and fully computerized stock accounting.

The site is certified to BS EN ISO 9002 and has its own NAMAS



TGD Pinnacle terminal

accredited laboratory which offers independent ASTM, IP and BSI standards of testing for petroleum, chemical and water products.

United Storage

Athel House, 167 Regent Road, Liverpool L20 8DD, UK
Tel: +44 (0)151 933 1010 Fax: +44 (0)151 933 7434

United Storage as part of the UM Group within Tate & Lyle Plc, operates eight terminals in the UK and also runs its own fleet of bulk liquid tankers under the name of Transtore. All terminals can be supplied by sea along short piggyback docklines.

Liverpool: Three terminals: two for the storage of vegetable oils and molasses with access to the deep water of the Mersey estuary. One for the storage of chemicals and petroleum products with deep-water access. Total capacity – 144,000 cubic metres, tanks ranging in capacity from 120 cubic metres to 13,200 cubic metres.

Birkenhead: Two terminals: one for the storage and processing of vegetable oils and fats. Alongside this terminal the processing division offers the facility to separate, filter and acid refine vegetable oils and fats for the food industry. One terminal for the storage of chemicals, lube oils/additives. Total capacity: 144,000 cubic metres, tanks ranging in capacity from 50 cubic metres to 10,000 cubic metres.

Hull: Two terminals: one for the storage of vegetable oils and molasses; another for lube oils/additives, chemicals and low-flash products. Batch and in-line blending facilities are also available. Total capacity: 50,000 cubic metres, tanks ranging in capacity from 65 cubic metres to 9,800 cubic metres.

London: One terminal at Silvertown on the Thames for the storage of vegetable oils, chemicals and lube oils. Total capacity 9,600 cubic metres, all tanks 640 cubic metres.

The company also offers a Contract Management Service whereby any part of the supply chain from port to end-user can be managed on behalf of a client. This can include the operation of the bulk liquid handling facility at the customer's own premises as well as the storage and transport off-site.

Van Ommeren

Head Office: Westerlaan 10, 3016 CK Rotterdam, The Netherlands
Director Marketing & Business Development: Paul Dekker
Tel: +31 10 464 2430 Fax: +31 10 464 2819

Website: www.vanommeren.nl **e-mail:** paul.dekker@vanommeren.com
Van Ommeren is a Dutch company that provides high-quality logistical services throughout the world in the fields of tank storage, tanker shipping and transport. Van Ommeren operates 54 terminals, in 23 countries, with a total capacity of approximately 15 million cubic metres.

Belgium

Antwerp, Gamatex

Commercial contact: Lieven de Witte
Tel: 32 3 561 1500 Fax: 32 3 561 1527

e-mail: lieven-de-witte@vanommeren.com

Gamatex is a 50/50 joint venture between GATX Terminals and Van Ommeren. This ISO 9002 certified terminal has 148 tanks with a total capacity of 486,100 cubic metres suitable for storage of petroleum products, chemicals and pressurised gases.

Access by: sea (4 berths, draught 13.5 metres), river (5 berths), rail, road and pipeline.

Service offered: blending, heating, chilling, lab on site, dedicated systems, weighing, nitrogen blanketing, drumming and 10,500 cubic metres stainless steel tankage available.

France

Fos-sur-Mer, Dépôts Pétroliers de Fos (DPF)

Commercial contact: P Fillet

Tel: 33 44 247 6500 Fax: 33 44 205 6208

This company, in which Van Ommeren has a share, operates one terminal in France at Fos-sur-Mer. The terminal has 40 tanks with a total capacity of 780,000 cubic metres suitable for storage of petroleum products and chemicals. Also suitable to store oleochemicals.

Access by: sea (5 berths, draught 24 metres), river (1 berth), rail, road and pipeline.

Service offered: blending, heating, dedicated systems, weighing and nitrogen blanketing.

Germany

Hamburg, Van Ommeren Tank Terminal Hamburg

Commercial contact: Bernd Kallsen

Tel: 49 40 751 960 Fax: 49 40 751 96332

e-mail: bernd.kallsen@vanommeren.com

This terminal located at the port of Hamburg has 300 tanks with a total capacity of 712,000 cubic metres and is suitable for storage of petroleum products, oleochemicals, vegetable oils, molasses, liquid fertilisers and latex. Also suitable to store gas.

Access by: sea (4 berths, draught 13 metres), river (4 berth), road, rail and pipeline.

Service offered: blending, heating, dedicated systems, weighing, nitrogen blanketing and drumming. ISO9002 certified terminal.

Netherlands

Port of Rotterdam, Van Ommeren Tank Terminal Botlek

Commercial contact: John Paul Broeders

Tel: 31 10 4729 700 Fax: 31 10 4722 030

e-mail: john-paul.broeders@vanommeren.com

This ISO 9002 certified terminal has 318 tanks with a total capacity of 1,068,000 cubic metres suitable for storage of chemicals and petroleum products.

Access by: sea (6 berths, draught 12.5 metres), river (7 berths), rail, road and pipeline.

Service offered: blending, heating, lab on site, dedicated systems, weighing, nitrogen blanketing drumming, chilling and 16,500 cubic metres stainless steel tankage available.

Eurogas Terminals

The Eurogas terminal in Vlissingen, with a storage capacity of 130,000 cubic metres, is the largest gas storage terminal in north west Europe. The terminal consists of six pressurised spheres 3,369 cubic metres gross and two refrigerated tanks each 55,000 cubic metres gross.

Access by: sea (2 berths, draught 13.5), river (2 berths), rail, road and 'common carrier propylene pipeline' (completion 4Q1999).

Services offered: chilling, dedicated systems, weighing and nitrogen blanketing.

Van Ommeren Tank Terminal Vlaardingen

Commercial contact: Ronald Okker

Tel: 31 10 4608 608 Fax: 31 10 4604 199

e-mail: ronald.okker@vanommeren.com

This ISO 9002 certified terminal has 400 tanks with a total capacity of 430,000 cubic metres suitable for storage of vegetable oils, oleochemicals and molasses. NOFOTA approved.

Bulk Storage Survey

Access by: sea (3 berths, draught 13 metres), river (11 berths), rail and road.
Service offered: heating, independent lab on site, dedicated systems, weighing, nitrogen blanketing, drumming, 10,000 cubic metres stainless steel tankage available, customs facilities, kosher certification, facilities for re-shipment of low flash-point products.

Van Ommeren Tank Terminal Europoort

Commercial contact: Jan-Bert Schutrops

Tel: 31 181 240 232 Fax: 31 181 240 217

e-mail: jan-bert.schutrops@vanommeren.com

This ISO 9002 certified terminal has 43 tanks with a total capacity of 910,000 cubic metres suitable for storage of petroleum products and chemicals.

Access by: sea (3 berths, draught 21 metres), river (6 berths) and pipeline.

Service offered: blending (eg gasoline), heating, lab on site, dedicated systems and nitrogen blanketing.

Spain

Commercial contact: Antonio Cano

Tel: 34 1 310 1176 Fax: 34 1 308 3304

e-mail: antonio.cano@vanommeren.com

Tarragona, Terquimsa: This terminal operated by Terquimsa SA (a 50/50 joint venture between Compania Logistica Hidrocarburos and Van Ommeren) is located at the port of Tarragona.

The terminal has 105 tanks with a total capacity of 160,000 cubic metres suitable for storage of petroleum products, chemicals, vegetable oils and fertilisers. The terminal is ISO 9002 certified.

Access by: sea (3 berths, draught 12.5 metres), rail, road and pipeline.

Service offered: blending, heating, chilling, dedicated systems, weighing, nitrogen blanketing and drumming. Marpol facilities, transshipping facilities, open 24 hours, in-bond facilities. Projects include: construction of a new PIT of 6,000 cubic metres to store lubes for completion in August 1998. New drumming plant completed June 1998. New rail station to be completed during 1998. Connection by five new pipes to customers plants (end 1998) and during 1999 to five more pipes.

Barcelona, Van Ommeren Tank Terminal Barcelona: The name Van Ommeren Tank Terminal Barcelona has been changed to Terquimsa, Barcelona. This terminal which is also operated by Terquimsa SA is located at the Port of Barcelona. It has 63 tanks with a total capacity of 35,000 cubic metres and is suitable for storage of petroleum products, chemicals, vegetable oils, asphalt and lube oils. Availability of 1,260 cubic metres of stainless steel tanks.

Access by: sea (3 berths, draught 12 metres) road and pipeline.

Service offered: blending, heating, dedicated systems, weighing, nitrogen blanketing. No pipeline connection. Transshipping facilities, open 24 hours, in-bond facilities.

Sweden

Gothenburg

Commercial contact: Rein Roger

Tel: 46 31 648 300 Fax: 46 31 548 095

e-mail: rein.roger@vanommeren.com

113 tanks from 50 to 25,000 cubic metres with a total capacity of 541,000 cubic metres for petrol, gasoil, light and heavy fuel oils, bunkering oils, lubricating oils, chemicals, vegetable oils etc, blending and conditioning, as well as the storage of international oil consignments in transit. Access by sea, road and pipeline. Services: heating and drumming. Five tanker berths. Can handle vessels up to 280 metres in length with a draught of up to 13 metres. Network of pipes is connected to the pipeline system of the refineries and the oil companies.

Gävle: 24 tanks from 25 to 35,000 cubic metres with a total capacity of 196,000 cubic metres for petrol, gasoil, light and heavy fuels, bunker oil, lubricating oils, chemicals, etc, blending and conditioning, as well as the storage of international oil consignments in transit. Access by sea (2 berths), road and pipeline. Can handle vessels up to 200 metres in length with a draught up to 10.4 metres.

Helsingborg: 12 tanks from 50 to 10,000 cubic metres with a total capacity of 34,000 cubic metres for petrol, gasoil etc. Access by sea (2 berths), road and pipeline. Services: heating. Can handle vessels up to 200 metres in length with a draught up to 10.4 metres.

Norrköping: 36 tanks from 30 to 3,000 cubic metres with a total capacity of 14,000 cubic metres for chemicals, petrol, gasoil etc. Access by sea (2 berths) and road. Can handle vessels up to 190 metres in length with a draught up to 8.4 metres.

Switzerland

Birsfelden, Van Ommeren (Schweiz) AG

Commercial contact: Rudolf Feierabend

Tel: 41 61 319 2929 Fax: 41 61 319 2940

e-mail: rudolf.feierabend@vanommeren.com

Operates one terminal in Birsfelden. This terminal has 63 tanks with a total capacity of 347,000 cubic metres suitable for storage of petroleum products.

Access by: river (5 berths) rail, and road.

Service offered: heating, dedicated systems, weighing.

United Kingdom

Van Ommeren Tank Terminal London

Commercial contact: Colin Scott

Tel: +44 1708 863 399 Fax: +44 1708 866 525

e-mail: colin.scott@vanommeren.com

This ISO 9002 certified terminal on the river Thames has 125 tanks with a total capacity of 349,000 cubic metres suitable for storage of petroleum products, chemicals and vegetable oils.

Access by: sea (3 berths, draught 11 metres) and road.

Service offered: blending, heating, dedicated systems, weighing, nitrogen blanketing, drumming, advanced computer systems for stock control and vehicle loading, HM customs & Excise bonded storage. Projects: Construction of a butane shipping line for completion in 1998.

Van Ommeren Tank Terminal Purfleet: This terminal, which is also located on the Thames, has 13 tanks with a total capacity of 5,000 cubic metres suitable for the storage of gases. Access by: sea (1 berth, draught 6 metres) and road.

Van Ommeren Tank Terminal Barry: This ISO 9002 certified terminal is located on the Bristol Channel at the west coast of the UK. The terminal has 80 tanks with a total capacity of 112,000 cubic metres suitable for storage of petroleum products, chemicals, vegetable oils and fertilizer solutions. The expansion 42,000 cubic metres is expected to be operational during the first half of 1999. Access by: sea (3 berths, draught 9 metres) and road. Service offered: blending, heating, drumming, dedicated systems, nitrogen blanketing and weighing.



Van Ommeren terminal

Van Ommeren Tank Terminal Ipswich: This ISO 9002 certified terminal located on the coast of East Anglia has 76 tanks with a total capacity of 89,000 cubic metres suitable for storage of petroleum products, chemicals, vegetable oils and fertilizer solutions. Access by: sea (5 berths, draught 8 metres) and road. Service offered: heating, drumming, dedicated systems, nitrogen blanketing and weighing.

VOTOB

Vereniging van Onafhankelijke Tankopslagbedrijven, Vlietweg 16, Leidschendam. Postal address: PO Box 443, 2260 AK Leidschendam, The Netherlands.

Tel: +31 70 337 8750 Fax: +31 70 320 3903

VOTOB embraces four member companies in the Netherlands, active in the storage of bulk liquid commodities and products. Together the members offer 14 installations in the ports of Amsterdam, Dordrecht and Rotterdam.

VOTOB is active at the interface with national government and with other professional associations with relevant similar interests. VOTOB is an active member of FETSA (Brussels), the European umbrella organisation which consults with government on an international scale, EU-Commission, IMO and similar bodies.

VTG-Paktank Tanklager Hamburg GMBH

Blumensand 38, 21107 Hamburg, Germany

Tel: +49 40 75 60 34 51 Fax: +49 40 75 60 34 89

Hohe Schaar (Hamburg): 427,000 cubic metres; sea, road, rail; 48ft; crude oils, petroleum products, chemicals.

VTG Vereinigte Tanklager und Transportmittel GMBH

Head Office: Nagelsweg 34, D-20097 Hamburg, Germany

Tel: +49 40 23 54 0 Fax: +49 40 23 54 27 00 Telex: 2170080 VT D

VTG, a member of the Preussag Group, is one of the largest independent tank storage companies in Europe. VTG operates large modern tank installations at seaports and inland with a total capacity of around 4 million cubic metres. Storage facilities are complemented by 25,000 rail tank wagons, special purpose wagons and tank containers for the transport of petroleum products, chemicals, gases and bulk goods. An inland tank shipping service operates on all major European waterways.

Berlin: 225,000 cubic metres, 85 tanks ranging from 50 to 20,000 cubic metres for all petroleum products, solvents and petrochemicals; access for barges, road and rail tank cars and liner trains.

Cologne: 101,000 cubic metres, tank volumes range from 50 to 25,000 cubic metres.

Duisburg Ölnisels: 270,000 cubic metres, 212 tanks varying in size from 100 to 9,000 cubic metres. Insulated, coiled, coated and aluminium tanks are available and equipped with dedicated pipelines, heating, blending, nitrogen blanketing, vapour-return and dry air ventilation facilities, petroleum products, chemical and petrochemical liquids, liquefied gases and solvents. Distribution by road, rail, barge and pipeline.

Duisburg Parallel-hafen: 38,000 cubic metres. Tank volumes 15 to 4,500 cubic metres for all petroleum products and chemicals. Access by tank-trucks and barges.

Ebrach: 5,000 cubic metres for storing petroleum products. 12 tanks.

Hanover: 320,000 cubic metres. 22 tanks ranging from 500 to 70,000 cubic metres for crude oil, petroleum products, chemicals and solvents. Access for road and rail tank cars, liner trains and barges; crude oil pipeline.

Hünxe: 900,000 cubic metres (568,000 for A1/332,000 for A111) for storing petroleum products. 51 tanks ranging from 1,000 to 55,000 cubic metres. Access for road and rail tank cars, barges and pipeline.

Munich: 155,000 cubic metres, ranging from 30 to 45,000 cubic metres for storing petroleum products, chemical and petrochemical liquids and solvents. Blending facilities for gasoline are available. Access by rail tank cars and tank-trucks.

Regensburg: 70,000 cubic metres, 60 tanks varying in size from 100 to 9,000 cubic metres. All petroleum products, chemical and petrochemical liquids and solvents. Heating, blending and mixing facilities. Distribution by road, rail and barge. Operation of the BP terminals.

Mainz-Gustavburg: 256,000 cubic metres, 33 tanks ranging from 8 to 40,000 cubic metres for all petroleum products, solvents and petrochemicals. Access by barge, road, rail tank cars, liner trains and pipeline (RMR).

Amsterdam: Comos Tank BV.

Düsseldorf: Omni Tank GmbH.

Hamburg: VTG-Paktank Hamburg GmbH.

Further details of these three companies are given under their separate headings.

Weser-Petrol

Seehafentanklager GMBH & CO KG

Cuxhavener Str. 42/44, PO Box 106149, D-28061 Bremen, Germany.

Tel: +49 421 396 99-0 Fax: +49 421 396 99-79

e-mail: mail@ds-bremen.de Web site: www.weser-petrol.de

Weser-Petrol, part of the Diersch & Schröder group of companies, operates storage installations in Bremen and Nordenham at the river Weser with a total capacity of 180,000 cubic metres. These modern facilities offer every possibility for a comprehensive distribution system for mineral oil products, mainly middle-distillates and molasses. In addition Weser-Petrol operates 50,000 cubic metres storage capacity for middle-distillates in Greifswald and Wismar on the Baltic Sea coast.



Weser-Petrol Seehafentanklager

Impact of military expenditure on oil depletion

One of the greatest structural economic problems that the oil-producing countries of the Middle East and North Africa have faced since the early 1970s is their overwhelming dependence on oil-export revenues, accounting for 85% to 90% of total revenues. As oil revenues decline, the governments seem to be running into ever more serious economic difficulties with rising foreign and internal debts and increasing social strains, reports *Dr Mamdouh G Salameh*.

In the 1970s and early 1980s, the Middle East and North Africa appeared to be an economic and social success story. Oil revenues soared and social conditions improved quickly. In the 1990s, however, the region appears to be sliding towards economic and social failure. Per capita income is falling and social conditions are deteriorating quickly (see **Table 1**). The Middle East and North Africa now make up the only major region of the world that is unable to feed its rapidly growing population. This has ominous political implications.

The rise in Islamic fundamentalism in the Middle East and North Africa in the mid-1980s coincided with the fall in oil prices and, therefore, oil revenues. However, Islamic fundamentalism has its roots in mounting conflicts of income distribution, exacerbated by rising social tensions.¹ It is, in essence, a protest against unaccountable governments who squandered the oil wealth of their countries through mismanagement of economic resources and wasteful military expenditure.²

Oil may have reduced the conflict potential when revenues were rising and subsequently enhanced it when revenues started to fall. This is, perhaps, the major link between oil and Islamic fundamentalism. To this may be added the strong indirect effect of falling oil revenues, in the oil-producing countries, on the economies of countries like Jordan, Egypt, Yemen

and Lebanon as a result of reduced remittances. Even in 1997, with low oil prices, remittances were about US\$90 per capita in Egypt. This represented about 40% of exports or 10% of the gross domestic product (GDP) according to the World Bank.³

Oil depletion policy

The choice of depletion rates for oil is a key policy parameter in any oil-producing country and has to take into account the current and future needs for revenues. Contrary to perfectly competitive markets, the oil market is highly sensitive to acts or perceived acts of one of the major oil producers, especially in the matter of depletion policy. From a private investor's point of view, this would be a strictly economic consideration. For a govern-

ment, the consideration is both economic and political.

Generalisations are difficult, however, because the economic situations vary profoundly among the oil-exporting countries. Some countries like Saudi Arabia, Kuwait, Libya and the UAE have large oil reserves and small populations, while others such as Algeria, Egypt and Iran have large populations and relatively small oil reserves.

The opposition to the Shah of Iran for years criticised his government's oil policy for squandering resources by pumping oil out too quickly and not taking the revenue needs of future generations into account. There was a particularly strong criticism that the oil policy benefited the oil-consuming countries of the West, particularly the US, by pumping oil out quickly and keeping prices low and also splashing out vast amounts of the oil revenues on wasteful military expenditure. Similar criticisms are now being voiced in Saudi Arabia.⁴

Oil revenues

Oil depletion according to revenue targets implies keeping oil in the ground once the ability to reasonably absorb oil revenues has been reached. A minimum rate of return on investment puts a limit on the need for revenue and consequently oil production. Furthermore, the rate of depletion becomes inversely linked to the price of oil because the volume required to meet the revenue target declines with a rising oil price and

	1980	1996	% Decline
Algeria	2,244	1,540	31
Iran	2,332	1,000	57
Iraq	4,048	848	79
Kuwait	20,940	16,099	23
Libya	12,893	4,334	66
Saudi Arabia	16,701	7,458	55
UAE	29,326	18,816	36

Source: Author's calculations based on data from Opec Statistical Bulletin, 1996

Table 1: GDP Per Capita in the Seven Major Oil Producers in the Middle East and North Africa, 1980-1996 (US\$)

	Oil Exports (bn bbls)	Export Value (bn 1992 US\$)	Gov. Exp. (bn 1992 US\$)	Military Exp. (bn 1992 US\$)	Military Exp./ Oil Export value (%)
Algeria	10	252	195	28	11
Iran	23	569	1,094	296	52
Iraq	10*	310	430	150	48
Kuwait	13	344	146	80	23
Libya	13	348	245	54	16
Saudi Arabia	60	1,536	886	541	35
UAE	17	389	130	41	11
Total	146	3,748	3,126	1,190	32

* No Iraqi oil exports were made between August 1990 and September 1996 because of the UN embargo.

Sources: OPEC Annual Statistical Bulletins, 1994-1995; BP Statistical Review of World Energy, June 1997; The International Institute for Strategic Studies (IISS) Military Balance, 1993-97; The World Bank, World Tables, 1992-97; UN Publications, National Accounts, 1974-97

Table 2: Crude Oil Exports, Government Expenditure and Military Expenditure, 1974-1997

risers with a falling one. Adjusting oil depletion to demographic growth takes future generations' needs into account and seeks to avoid waste.³

Military expenditure

Over the period 1974-97, the combined oil exports of the seven leading oil exporters in the region – that is Algeria, Iran, Iraq, Kuwait, Libya, Saudi Arabia and the UAE – were 146bn barrels. The total value of crude oil and refined products exports, measured in constant 1992 US dollars, was about \$3,748bn.⁴

The total government expenditure was about \$3,126bn.⁵ Military expenditure over the period 1974-97, measured in constant 1992 US dollars, has been estimated at \$1,190bn.⁶ For the seven countries combined, military expenditure seems to have made up 32% of their oil revenues – seen over the period 1974-97 (see Table 2).

For the seven countries, the total oil output less those needed to finance military expenditure would have totalled 100bn barrels over the period 1974-97, as opposed to actual oil exports of 146bn barrels. The saving of 46bn barrels amounts to an average production of 5.48mn b/d over the entire 23-year period. This is virtually equivalent to the combined production of both Mexico and Canada over that period.

Without even some of the oil needed to finance the military burden, the potential impact on the oil market would have been considerable. In the mid-1970s, oil prices would probably have stabilised and then risen in real terms. The hypothetical withdrawal of 'military oil' would have had the greatest impact on Iranian and Saudi oil supplies.

With already higher oil prices, the Iranian revolution in 1979 would probably have had a more moderate impact if it had taken place in the

same way. Indeed, higher oil revenues and more resources available for civilian purposes could have blunted Iranian opposition and smoothed the political transition. Hence in the early 1980s the absence of the huge military burden would have facilitated the defence of high oil prices. At this time, the hypothetical withdrawal of Iranian, Iraqi and Saudi 'military oil' would have made the greatest impact on Middle Eastern oil supplies.

Indeed, it could be argued that without the need to sell oil to finance the huge military expenditure, it is doubtful whether oil prices would have collapsed in 1986.

The first lesson to be learnt is that the high level of military expenditure in the Middle Eastern and North African countries is detrimental to the economic and social welfare of the population. Hence the huge arms purchases of the region are in direct conflict with its more comprehensive economic interests. The population pressure intensifies this conflict year by year.

In this perspective, the military spending burden represents a considerable risk for the region's leaders. Because their spending priorities conflict with the overall interests of the population, they may be dispensed with. Rising population pressure and generational change increase this risk.

The second lesson is that for the foreign powers that import oil from the Middle East and North Africa and export arms there, the huge military budgets represent a double political risk. First, Middle Eastern and North African governments with policies conducive to massive arms imports could change suddenly, eradicating the local weapons market and hence a source of earnings for the arms exporters.

Second, reduced military spending would improve the financial situation

of the countries concerned and eventually permit keeping more oil in the ground. Hence oil importers and arms exporters run the double risk of losing lucrative markets as oil prices eventually shoot up. The counterpart is that the Western oil importers and arms exporters could have an interest in maintaining Middle Eastern and North African autocratic regimes that spend heavily on arms.

In conclusion, a flexible oil depletion policy and a rational use of the oil revenues could have an enormously positive impact on the economies of the Middle Eastern and North African oil exporters by stopping the squandering of the oil reserves on military expenditure and also by taking into account the health of the oil fields and the revenue needs of future generations. This will equally impact on the global oil supplies, the price of oil and the global armaments industry. ●

* Dr Mamdouh G Salameh is an international oil economist, a consultant to the World Bank in Washington DC and a technical expert of the United Nations Industrial Development Organisation (UNIDO) in Vienna. He is also a member of the International Institute for Strategic Studies (IISS) in London.

Footnotes

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3. *The World Bank, World Tables, 1992-97*.
4. Sheikh Ahmad Zaki Yamani, *Containment is Too Risky, Petroleum Review*, May 1997, p 211.
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6. Author's calculations based on data from OPEC Statistical Bulletins, 1994-96, BP Statistical Review of World Energy, June 1997 and World Bank, *World Tables, 1992-97*.
7. UN Publications, *National Accounts, 1974-97*.
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Going for gold in the Gulf

Oil companies continue to be enthusiastic about the Gulf of Mexico, despite depressed oil prices, reduced E&P budgets and a shortage of drilling rigs. Bidders for deepwater blocks in the Gulf's Central Region at the March 1998 MMS auction offered \$1.4bn more for leases than they had in March 1997, with Marathon, Mobil, Oryx, Elf, Statoil and Mariner especially active, writes Judith Gurney.

The spotlight on dramatic deep-water plays gives a misleading impression, however. In mid-1997, companies, mainly independents, had more than 3,700 active leases in waters with depths less than 200 metres and were producing 94% of total gas and 82.7% of total oil output from the federally controlled offshore continental shelf (OCS). In addition, there is production in shallow offshore waters controlled by the coastal states of Texas, Louisiana and Alabama.

The Gulf offers many attractions. Companies enjoy the assurance of legally binding contracts, a favourable tax regime, and the benefit of more than 25,000 miles of offshore pipelines as well as numerous platforms well-placed to serve as gathering points for new lines and sub-sea tiebacks. There are many onshore refineries and gas-processing plants located along the coast. Companies working in deepwater projects enjoy 8- to 10-year leases and a royalty rate of 12%, with production exempt from royalty until output reaches a given amount, depending on water depth. Deepwater wells often prove to have unusually high production rates which reduces development costs.

Staying power

The staying power of the Gulf is evident in production statistics. Oil production peaked at 1.03mn b/d in 1971 and then declined, except during the early 1980s. In 1990, it started to increase and by 1996 reached 1.05mn b/d, with 1997 output estimated at 1.18mn b/d. The MMS anticipates continued short-term growth, partly as a result of technological advances, reaching either a low of 1.7mn b/d or a high of 2.0mn b/d in 2002, with an increasing proportion of output coming from deepwater fields.

The gas scene is different. Output peaked in 1981 at 13.4bn cf/d and declined steadily until 1993. It then rose to 13.12bn cf/d by 1996 and an estimated 14bn cf/d in 1997. The MMS anticipates a low of 12.43bn cf/d or a high of 17.54bn cf/d in 2002. Deepwater fields are not expected to contribute significantly to gas output but a recent assessment by the US Geological Survey suggests that a lot of gas remains to be found in shallow waters in deeper reservoirs than those currently under production.

For many companies, the Gulf is an

offshore laboratory where they can experiment, gain experience, reduce risk and work out cost-reduction solutions for exploration, development and production in the more than 240 deepwater basins which have been identified elsewhere. This is particularly true for production systems where there have been notable advances in the design and efficiency of tension leg platforms, compliant towers, spars and subsea systems. This unique opportunity keeps old-timers like Shell, Exxon and BP active in the Gulf and serves as a magnet for newcomers such as Elf, British-Borneo, Statoil, Enterprise Oil, TOTAL, Petrofina, BHP and Nippon Oil.

Companies, of course, seek profits as well as experience, and they follow different strategies in order to acquire commercially profitable reservoirs. Given the amount of seismic data that is available for the Gulf, competition is strong. In addition to active bidding for leases at auctions, there is a busy secondary market where leases and equity holdings are swapped, with some companies bidding for blocks at auctions solely for the purpose of using these as bargaining chips in post-auction trading.

On the deepwater front, companies are pushing further out from shore. The popular Central Region areas, which continue to yield discoveries, are Viosca Knoll, Mississippi Canyon, Green Canyon and Ewing Bank. These were responsible for 68 of the 90 deepwater discoveries reported by year-end 1997 and for 23 of the 26 projects in production. The only comparable area in the Western Region is Garden Banks, where 15 discoveries had been reported by year-end 1997 with two fields in production and several under development.

There is a lot of interest in ultra-deep areas, particularly Alaminos Canyon, Keathley Canyon, Atwater Valley and Walker Ridge. The number of blocks with water depths greater than 800 metres leased in the Western Region increased by more than tenfold, and in the Central Region by fivefold, between 1995 and 1997. Some of these blocks are close to the so-called Western Gap, an area not covered by the maritime boundary treaty between the US and Mexico as it lies outside the Exclusive Economic Zones of both countries. The Baha Alaminos Canyon discovery reported by Shell and partners Mobil, Amoco and Texaco in 1997 is near the Western Gap and these com-

panies have bid heavily for other nearby blocks. Negotiations which have begun to divide the disputed territory are expected to be prolonged.

Sub-salt slowdown

Interest has subsided lately for sub-salt projects. The excitement which fol-

lowed the discovery by Phillips of the Mahogany field, and by Shell of Enchilada, ebbed after expensive dry holes were drilled through salt formations in blocks obtained at auctions at very high prices. Hopes for commercial sub-salt fields have not faded completely. Texaco is developing its Gemini deepwater sub-salt field and a few

companies are still exploring and evaluating discoveries. At the moment, however, most companies feel that scarce rigs are more profitably used in deepwater blocks that offer more assurance of discoveries, especially since these blocks must be relinquished when their leases expire if no wells have been drilled.

Field name	Water depth (ft)	Operator	Start up	Oil & gas reserves	Prod'n system	Peak prod'n (yr)	Cost
<i>Viosca Knoll</i>							
Marlin	3,263	Amoco	1999		Tension leg platform	40,000 b/d, 250mn cf/d	\$500mn
Neptune	1,930	Oryx	1997	75mn boe	Spar	24-30,000 boe/d	
Nile	3,535	Amoco					
Petronius	1,750	Texaco	1998/9		Compliant tower		\$400mn
Pompano A	1,290	BP	1994		Steel platform		
Ram-Powell	3,218	Shell	1997	250mn boe	Tension leg platform	60,000 b/d, 200mn cf/d	
Tahoe	1,500	Shell	1994	130mn boe	Subsea		\$1bn
Thor	1,720	Oryx			Subsea		
Virgo	1,132	Elf	1999		Steel platform		
VK 862	1,040	Walter Oil	Planning		Subsea		
<i>Miss'ppi Canyon</i>							
Alabaster	1,059	Exxon	1992		Subsea		
Amberjack	1,029	BP	1992		Steel platform		
Cognac	1,025	Shell	1978		Steel platform		
Coulomb	7,520	Shell	2003				
Crosby	4,452	BP					
Diamond	2,095	Oryx	1997				
Europa	3,900	Shell	2000	160mn boe	4 subsea wells via Mars	60,000b/d, 45mncf/d 2001	\$500mn
Fourier*	6,950	Shell	2001				
Gemini**	3,393	Texaco	1999	3-4mn b cond, 150-300bn cf	Spar + subsea		\$185mn
Gomez	2,985	Union Pacific	2000	100-140mn b			
King	3,250	Vastar	1999		Subsea		
King	5,149	Amoco	2001		Spar		
Lena	1,018	Exxon	1984		Guyed tower		
Leo	2,500	British-Borneo Evaluation					
Mars	2,940	Shell	1996	700mn boe (gas 15%)	Tension leg platform	100,000 b/d, 100mn cf/d	\$1.2bn
MC 26	1,272	BP					
MC 411	1,520	Enserch	1993		Subsea		
MC 443	2,095	Walter Oil					
MC 533	1,000	Walter Oil					
MC 837	3,900	Walter Oil					
Mensa	5,237	Shell	1997	720bn cf	Subsea	300mn cf/d	\$280mn
Metallica	7,000	BP					
Mickey	4,350	Exxon	2000				
Narcissus	4,250	Texaco					
Nirvana	3,414	BP	2000				
Pluto***	2,828	Mariner	end 1999				
Pompano B	1,865	BP	1996		Subsea		
Unnamed*	6,739	Shell	Planning				
Ursa	3,950	Shell	1998/9	400mn boe	Tension leg platform	150,000 b/d, 400mn cf/d	\$1.45mn
Zeus	3,905	Exxon					
Zinc	1,478	Exxon	1993				
<i>Green Canyon</i>							
Allegheny	3,225	British-Borneo	1999	120mn boe	FPF and subsea		
Angus	2,000	Shell	1999	64mn boe	4 subsea via Bullwinkle	40,000b/d 60mn cf/d 1999	\$200mn
Bison	2,500	Exxon					
Bullwinkle	1,350	Shell	1988		Steel platform		\$500mn
Brutus	2,877	Shell	Producing		Subsea		

Table continued on p42...

Deepwater fields in Gulf of Mexico

Field name	Water depth (ft)	Operator	Start up	Oil & gas reserves	Prodn system	Peak prodn (yr)	Cost
...table continued from p41							
Fuji	4,269	Texaco	2001		Subsea?		
GC 228	1,638	Texaco					
GC 37	2,024	British-Borneo					
GC 82	2,400	Kerr-McGee					
Genesis	2,597	Chevron	1998	160mn boe	Spar	55,000 b/d, 72mn cfd 2000	\$750mn
Glider	3,300	Shell	2000		TLP		
Grand Canyon	1,715	Conoco	2000		TLP		
Joliet	1,760	Conoco	1989		Tension leg platform		
King Kong	3,817	Conoco	2000		FPS + subsea		
Popeye	2,100	Shell	1996	10mn cond, 320bn cf	Subsea		
Poseidon	4,489	BP					
Rocky	1,785	Shell	1995		Subsea		
Shasta	1,040	Texaco	1995				
Stellaria	2,045	Marathon/Shell					
Toro	1,465	Shell					
Troika	2,761	BP	1998	200mn boe	Subsea via Bullwinkle	80,000 b/d, 140mn cf/d	
<i>Alaminos Canyon</i>							
Baha	7,620	Shell	Planning				
Hoover	4,705	Exxon	2000		DDCV		
South Diana	4,852	Exxon	Planning				
<i>Desoto Canyon</i>							
King's Peak	6,530	Amoco	1999		Tie-back to Desoto177		
<i>Atwater Valley</i>							
Neptune	6,220	BP	Planning		FPS + subsea		
<i>Ship Shoal</i>							
Agate		Phillips	1998	100mn boe	Subsea via Mahogany		
Mahogany		Phillips	1996		Floater		
<i>Ewing Bank</i>							
Arnold	1,752	Marathon	2000		Subsea to Lobster		
Black Widow	1,850	Mariner					
EW 1006	1,882	Walter Oil	1998		Subsea		
Morpeth	1,673	British-Borneo	1998	92mn boe	TLP + subsea		\$210mn
Oyster	1,200	Marathon	2000		Semi + subsea		
Sunday Silence	1,450	Tatham Offshore	1999		Spar + subsea		
<i>Garden Banks</i>							
216	1,946	Amerada					
254	1,920	Chevron					
386	2,300	Enserch					
Auger	2,860	Shell	1994		Tension leg platform	60,000 b/d, 130mn cf/d	\$1.1bn
Baldpate	1,650	Amerada	1998	100-200mn boe	Compliant tower		\$320mn
Conger	1,526	Amerada					
Cooper	2,080	Enserch	1995		Subsea		\$200-15mn
Knight	1,740	Santa Fe					
Ladybug	1,355	Texaco					
Llano	1,526	EEX					
Macaroni	3,700	Shell	1999	78mn boe	3 subsea via Auger	35,000 b/d, 65mn cf/d	\$270mn
Penn State	1,450	Amerada			Subsea via Baldpate		
Salsa	1,076	Amerada			Platform via Enchilada		
Sorano	3,153	Shell					
<i>East Breaks</i>							
Diana	4,763	Exxon	2000		Tie-back to Hoover		
East Boomvang	3,800	R & B	2002		FPS + subsea		
North Boomvang		3,688	R & B				

*(Part of NAKIKA project which includes Ariel, Herschel and Keppler) ** Subsalt field *** formerly Blood Sweat & Tears operated by BP

Deepwater fields in Gulf of Mexico

Gas-to-liquids forges forward despite low crude prices

Gas-to-liquids (GTL) projects appear relatively unscathed by today's low crude prices of around \$14/b, although these levels contrast sharply with the \$20/b assumed in most published estimates of the commercial viability of GTL processes. Sasol, in particular, seems to be leading the field, offering its in-depth experience of the Fischer-Tropsch process to partners who have gas they want to commercialise, reports **Fred Thackeray**.

Sasol's biggest coup to date (in a joint agreement with Phillips Petroleum), is a deal with Qatar's QGPC. The project, which leading Qatari economist Ibrahim B. Ibrahim says is 'definitely going ahead', is for a 20,000 b/d plant. It will be built at Ras Laffan. As this is also the site of the Qatargas LNG export facility it offers extensive in-place supporting infrastructure. The GTL plant is expected to yield a 'reasonable return' on investment and repay debt with crude oil prices at \$16/b, according to George Couvaras, General Manager of Sasol Synfuels International. Speaking at a recent conference in Doha, he noted that the plant at Ras Laffan will break even with crude prices at \$12/b.

The Qatar project rests on the immense reserves of gas in the North field, which the government is keen to monetise in all ways possible. Sasol's strategy, however, is also taking it into a number of different environments from the Niger Delta to offshore

Norway. In Nigeria it is participating with Chevron in a proposed 20,000 b/d GTL plant to be built at Escravos. The reason in this case, is the very large volumes of associated gas regularly flared in Nigeria and the increasingly severe penalties exacted by the government to punish flaring.

In Norway, Sasol has formed an agreement with Statoil to pool the two companies' expertise to develop small-scale floating GTL plants. The initial objective is to commercialise stranded gas in more than 100 small fields offshore Norway. The first plant is planned to go onstream in 2001 to produce 4,500 b/d of synthetic crude from 1mn cm/d of natural gas. The next stage, currently under study, may be a slightly bigger floating plant to produce 14,000 b/d of syn crude from 3mn cm/d of natural gas.

Sasol's technology is one of three leading GTL technologies evaluated and costed in a recent Arthur D Little (ADL) study. The others are technologies developed by Exxon and Shell. On the basis of detailed calculations that assume crude oil prices at \$20/b, ADL estimates profitability of a similar order for each of the technologies. Depending on the location costs and the costs of gas feedstock, they calculate real rates of return ranging up to 20% for plants of 100,000 b/d.

The locations studied comprise 11 fields and basins selected from around the world with natural gas reserves of at least 5tn cf. These are: one in Eastern Venezuela, Qatar's North field, the Camisea field in Peru, Alaska's Prudhoe Bay, the Niger Delta, Tierra del Fuego, Australia's NW Shelf, Sakhalin, Tengguh field in Irian Jaya, Norway's far northern Snøhvit field and the Papua New Guinea Fold Belt. On the basis of the assumptions used, some of these were estimated to be profitable, some not.

The consultant is highly secretive about the engineering information which underlies its study. This is due to confidentiality requirements to respect the very large commercial interests at stake in the lengthy and costly research programmes which are now on the brink of implementation. Some measure of the importance of these requirements is provided by Exxon's statement at the recent Doha conference that its AGC-21 GTL processes, catalysts and products are protected by 400 patents in the US and by more than 1,500 patents worldwide.

Although ADL is not prepared to reveal the detailed results of its 500-page report, its overall assessments based on a wide-ranging knowledge of developments to date are of considerable interest. In summary, the authors of the report conclude that:

- Investments in GTL over the next 15 to 20 years could reach between \$15bn and \$20bn, establishing 15 to 30 plants with a total capacity of between 1mn to 2mn b/d.
- Consuming countries will be interested in the environmental benefits of GTL diesel but it will be marketed principally as a blending component rather than as a niche fuel.
- GTL technology can be economic at 50,000 b/d plant sizes and above with Brent crude prices of about \$20/b.

GTL technology can be further improved through scale enlargement, learning curve effects and other technology breakthroughs. The technology is broadly competitive with LNG and/or pipeline gas.

Project economics are highly dependent on construction costs, location factors and gas cost with only selected fields providing acceptable returns.

Output from GTL plants, even with the most optimistic construction schedule, will not seriously disrupt oil markets over the next 15 to 20 years. There is, however, potential to impact regional distillate and naphtha markets. Also, the impact on crude oil markets is likely to be felt in short-term price weakening and on those crudes which have larger than average distillate makes. ●

Bintulu rebuild

Shell Middle Distillate Synthesis (Malaysia) recently announced plans to reconstruct parts of its natural gas-to-liquids complex in Bintulu, Sarawak, which were damaged in an explosion on 25 December 1997.

Work was scheduled to commence at the end of June, subject to putting in place final arrangements for long-term gas supply and various approvals from relevant government authorities. Restoration work will mainly entail the construction of a new air separation unit.

Production is expected to resume in early 2000.

Iranian drive to drum up foreign investment

During past weeks, Iran has been conducting an intensive international tour to publicise its invitation for foreign oil investment and technology to join in its petroleum development in the biggest drive to boost capacity since the Islamic Revolution of the late 1970s. Tehran's Majlis has already approved a first-stage push for \$5.5bn of international investment during 1998/99, and 43 energy projects are now on offer, writes *Mike Wells*.

The attractions on display cover a huge range of partnership ventures with National Iranian Oil Company (NIOC) in the development of onshore and offshore fields and, for the first time, involvement in oil and gas exploration. The degree of openness and the amazing amount of detail presented to interested foreign parties can be seen in the context of its new moderate President Mohammed Khatami's policies of international dialogues to improve Iran's relations with both the West and the Arab nations, his emphasis on civic and legal freedoms and the reforming growth of a civil society.

Iran's Deputy International Affairs Minister Mehdi Hosseini was in London in early July 1998, leading a considerable team of high-level NIOC technical managers in detailed presentations on exactly what the country has on offer. A two-day conference, plus an additional two days of contracts workshops, organised by IBC Conferences and backed by the Society for Contemporary Iranian Studies and the UK's Energy Industries Council, attracted up to 450 delegates from 150 countries and clearly showed the level of interest from the international industry.

Proven reserves

With global upstream competition more intense than ever before and general acceptance that lower crude prices will remain at around current levels for some time, international oil companies are even more eager to gain access to large proven reserves in lower-cost established producing areas.

Iran has proven reserves of 96bn barrels of oil (fourth in size after Saudi Arabia, Iraq and Kuwait) and some 740tn cf of gas (second after the FSU). NOIC estimates that between 20bn and 30bn barrels of oil remain to be found. Current output is some 3.6mn b/d and

approximately 40.5bn cm of gas, based on international estimates.

But the basic hurdle for most foreign companies to date in signing up for the 11 buy back service contracts announced in November 1995, has been their short duration and the US sanctions against Iran. Although Washington has now virtually dropped its unenforceable sanctions policy against non-US firms investing in Iran (except for petroleum pipelines crossing the country), the US oil industry currently remains out of the bidding to the stated regret of the Iranians.

As to the buy back service contract form, Hosseini said that he recognised oil company criticisms, but it was in force because of Iran's constitutional prohibition of foreigners owning any of its petroleum reserves. It would appear that this is a likely compromise stage for the short to medium term, and there were hints that liberalisation was on the horizon as a new foreign investment law is on the government agenda.

The short six- to seven-year time span of the contracts were, Hosseini admitted, a particular objection for the majors, but this would be offset by longer-term supply contracts giving foreign companies security of supply. Existing terms also involve the contracting oil company financing the entire project, with a cost-plus agreed rate of return on its investment reimbursed out of the proceeds from the production. When a field becomes commercial, the exploration/appraisal contractor has priority for the development phase so long as it is competitive with other applicants.

The Minister said: 'We want to solve these problems and compromise between our limitations and foreign companies' expectations, and achieve an acceptable rate of return for both parties'. This he put at 'about 15%', being the level involved in the earlier contracts. Companies will be able to dis-

cuss tenders at an NIOC workshop in Tehran on 3-5 August 1998.

The areas opened up for exploration stretch from the shores of the southeast Caspian to the Gulf of Oman and include regions close to the borders with Iraq and with Azerbaijan. There are 17 on- and offshore blocks involving further seismic work and exploratory drilling in what NIOC describes as highly prospective areas containing a possible 20bn barrels of oil.

On offer

Development is offered in new fields with a total 8bn barrels of oil in place, including Sarvestan and Saadat, Abad/Jufeyr, Darquain/Rig, Shoroom and Dudron. Gas injection projects would include giant fields such as Agha Jari, Ahwaz and Cheshmeh Khosh, and others under consideration, with expected additional recovery of about 8bn barrels. Certain of the older producing fields would involve increasing production by horizontal or infill drilling and secondary recovery, where total remaining oil in place was said to amount to around 10bn barrels.

The considerable number of Gulf developments on offer include South Pars, Hendijan, Nowrooz, Esfandiar and Salman.

Participation is also invited for the modernisation of the Abadan refinery and raising its capacity from 400,000 to 600,000 b/d, with new distillation units and a vis-breaker. Preliminary studies have also been conducted on 30 petrochemical expansion projects requiring foreign capital of over \$12bn and producing 21mn t/y of products.

Minister Hosseini stated that about \$8bn needed to be invested in development projects over the next three to five years, including raising oil and condensate production by 1.4mn b/d. Its producing capacity 'should be around 7mn b/d', rather than the current 4.1mn. He expected that, next year, the Majlis would increase the foreign investment total allowed, and that more exploration and production projects would be introduced to foreign companies in coming years.

Next November will see an oil and gas trade mission visit to Iran, organised by the Energy Industries Council, and supported by the DTI and the FCO. Meanwhile, copies of the four-day conference proceedings and discussions are obtainable from IBC UK on +44 (0)171 453 5446/7.

State of play on LNG

Three years ago, when the world LNG community gathered in Birmingham, UK, for the 11th International Conference and Exhibition on Liquefied Natural Gas (LNG 11), the talk was of new projects, soaring demand and consistently rapid growth in world trade. How things have changed, writes *Peter Mackay*.^{*} When the industry convened in Perth, Western Australia, at the beginning of May 1998 for LNG 12 there was gas aplenty, new ideas in all corners of the show halls and LNG projects queuing up for finance. There was just one element missing: buyers.

Since the economies of Asia first hit trouble in the 3Q1997, all forecasts of energy demand in the region have been revised downwards. Combine this with the weakest oil prices for some years and the attraction of LNG rapidly begins to pall.

Declining demand has been felt most acutely in South Korea, where the Korea Gas Corporation (Kogas) had hitherto been leaning heavily on LNG to meet rapidly rising energy use. Kogas had planned to order another tranche of new LNG tankers to carry imports into the country this year but this will not now happen; indeed, at least one of the seven ships ordered last year has been cancelled. Saddled with 'take or pay' contracts Kogas has had little alternative than to receive contracted cargoes, although it has managed to cancel a number. It has also been reported that it has had to vent LNG in its receiving terminals to the air in order to provide enough capacity to accept incoming cargoes.

Lost potential

If the discontinuity in the upward trend of LNG demand in existing consumer nations has been hard to bear, the mood at LNG 12 was also depressed because of the lost potential from new importers, which had been expected to make up a large proportion of incremental demand.

LNG projects will not go ahead without a lengthy commitment – commonly 20 years – and for such commitment to be forthcoming both seller and buyer need to be confident that the project is viable. Perhaps more importantly the project's financiers also have to be convinced and the sudden economic fragility shown not only by Japan and Korea but also by potential importers such as Thailand and the major LNG exporters Malaysia and Indonesia has certainly frightened the money away.

While the economic situation in India

is less troubled than elsewhere in Asia and progress is still being made on some of the proposed LNG receiving terminals, lenders will not have been pleased by the recent nuclear bomb tests in India and Pakistan, which have had an effect on India's international political standing.

During LNG 12 one project did take a step forward. BG UK Holdings, a subsidiary of BG plc, announced that it had signed a memorandum of understanding with Yemen LNG Co for the supply of 2.65m t/y of LNG for 25 years beginning between mid-2002 and mid-2003, with an option to double this volume. The LNG is earmarked for a gas distribution operation being developed by BG and local partners in north-western India and would be shipped to Pipavav. Indeed, this is the only Indian LNG import proposal not linked to independent electric power production.

Cost reduction

In an environment of such weak demand for LNG, all efforts towards cost reduction in the delivery chain count for little. Even if the delivered cost of LNG could be reduced significantly, that alone could not generate additional demand in the importing nations, nor would it be likely to have a concrete effect on the attitude of lenders to the medium-term dependability of new projects.

Still, there were several companies at the LNG 12 event with ideas which would reduce the overall cost of LNG production and delivery or which promised to make the exploitation of stranded gas reserves viable. In particular, several companies were showing ideas for floating LNG production, storage and offloading systems or for gravity-based platforms.

The FPSO is an established part of oil production and has already been employed in the relatively calm waters of West Africa for LPG and condensate pro-

duction. Putting a gas liquefaction train and LNG storage capacity on a floater in harsh conditions calls for a leap of faith, however, both that the established shoreside standards for safe separation distances can be ignored and that the necessary new equipment can be developed, tested and trusted. This is probably not the best time to ask investors to take the plunge in such radical ideas.

Other approaches to cost reduction were put forward during the conference sessions. Atlantic LNG, operator of the Trinidad project currently under development for 1999 startup, explained how a different approach had been taken in order to achieve cost savings of up to 40% compared to previous projects. This needed a willingness on the part of the operator to do things differently and find contractor partners prepared to do the same. For instance, unnecessary design margins and redundancies were eliminated through the use of accurate modelling.

Speakers from Bechtel Corp showed how greater integration of the LNG supply chain to independent power producers could also work to the mutual advantage of all parties and a paper from MW Kellogg looked at potential cost savings in individual elements within the liquefaction plant.

Forecasting the future

Despite the best efforts of these thinkers, however, potential new LNG export projects or expansions to current plants will have to wait for a more promising demand scenario. Forecasts of gas demand in Asia in 2010 have been drastically reduced, with Petronas now expecting total demand to be 12tn cf rather than 16tn cf as previously projected.

What came out of the LNG 12 show most forcefully was not thoughts of a bright future but a reminder that the liquefaction and ocean transport of natural gas in the form of LNG is just a way of getting natural gas from the wellhead to the consumer. If gas is not needed, or if it can be got to the consumer more cheaply in another guise, then there is no demand for LNG. Gas-to-liquids (GTL) technology is getting cheaper and this could provide an alternative outlet for companies and countries looking to get gas in the ground to the buyer but, once again, the Asian market looks unlikely to present opportunities in the short term at least.

LNG 13 will take place in 2001 in Seoul, South Korea. Whether producers will be any happier at that show than they were at Perth depends to a very large extent on whether the Korean economy can recover and drag LNG demand with it.

^{*} Peter Mackay is Editor of *Hazardous Cargo Bulletin*.

NEW Publications

ANEP 1998: Yearbook of the European Petroleum Industry

(Available from Urban-Verlag, Postfach 70 16 06, D-22016 Hamburg, Germany). 380 pages. Price: DM194.

Now in its 31st edition, this book is subdivided into four independent sections. Part 1 provides information on individual oil and gas fields/finds, both onshore and offshore Europe, supplemented by an index. A detailed colour map showing individual fields and deposits, as well as oil and gas pipelines, is provided for each country. A table of European refineries detailing location, ownership and capacity is also included in this section, together with a map of refinery locations and oil and gas pipelines.

Part 2 includes around 200 tables (some with graphics) providing statistics on energy consumption, demand, petroleum/petroleum products and natural gas imports/exports, and consumption of specific products by individual countries within OECD Europe and central and eastern European countries (including the former USSR).

Part 3 contains a list, ordered by country, of firms involved in the oil and gas industry; exploration/production, refining, imports/exports, trade and distribution, and storage and transportation. This is accompanied by a list of relevant organisations, institutes and administrative groups.

Part 4 offers an insight to the European supply and service market with firm entries categorised into specialist areas. This is supplemented by an index of reference sources and Buyers' Guide with some 400 categories.

Pipe Line Rules of Thumb Handbook*

Editor: E W McAllister (Gulf Publishing Company, PO Box 2608, Houston, Texas 77001, US). ISBN 0 88415 671 0. 604 pages. Price: \$79 (£64).

Now in its fourth edition, this publication contains a collection of straightforward, common-sense techniques to solve pipeline problems. Offering a range of shortcuts, clear calculations and practical 'how to' methods, the book will be of use to those concerned with the design, construction and engineering of oil, gas and products pipelines. New information in the revised edition includes basic mathematical formulas, stress in guy wires, land descriptions, polypipe design data, floodlighting concepts, marine hose data and rotary screw pumps.

The Interconnectors: The Commercial and Operational Implications for the European Gas Industry

Mike Madden (FT Energy, Maple House, 149 Tottenham Court Road, London W1P 9LL, UK). ISBN 1 85334 915 1. 129 pages. Price: £395.

This publication provides an insight into the three European interconnectors: UK-Belgium, UK-Northern Ireland and UK-Ireland. Each project is examined on an individual basis, from initial considerations regarding financing and regulation through to the gas contracts in place and opportunities for third party access.

Plan to Win: Turning Strategy into Success*

Dr Steve Smith (Quest Worldwide, The Manor House, Huxley Close, Godalming, Surrey GU7 2AS, UK). ISBN 1 899682 45 7. 136 pages. Price: £15.

Strategy implementation can be pivotal to the success or failure, prosperity or decline, of a business. This book introduces a management system that aims to help managers at all levels understand strategy implementation and their critical role in it.

European Downstream Oil Industry Safety Performance - 1996*

(CONCAWE, Madouplein 1, 1210 Brussels, Belgium). 16 pages. This report (No. 4/97) is the third by CONCAWE reviewing the safety performance of the downstream oil industry in western Europe. It includes the results of 28 companies which together represent over 90% of the oil refining capacity in Europe and is therefore a representative sample of the industry. Overall, the reported hours worked by company staff and contractors combined in 1996 were about 420mn with an average lost workday injury frequency of 4.7 which compares with 4.6 in 1995, 4 in 1994 and 4.7 in 1993. A range of other measures of safety performance are also reported. In general, the safety performance for the companies reporting in 1996 was similar to that reported previously for 1993, 1994 and 1995.



The IP Library continues to acquire new titles and notable among the most recent additions are:

- World Petroleum Arrangements 1997, Volumes 1-4. Barrows Company Inc, January 1998.
- Competition in the supply of petrol in the UK. Office of Fair Trading, May 1998.
- BP Statistical Review of World Energy 1998.
- Petroleum Act 1998

In addition, the volumes asterisked in the reviews on this page are also available to members.

Information, however, comes in a variety of sources and last month saw the Library update the Telerate screen service to its latest, and easy to use, format. A wealth of up to the minute industry information is available to Library visitors from this source.

Recently the Library has also received/acquired various CD-ROMs, including:

- Petroleum Economist Global LNG map; Energy in Russian and Eastern Europe; and Energy in Western Europe
- April update to Petroleum Abstracts.

Over recent months the Internet has attracted very considerable attention and there is a danger that its value as a source of information is being oversold. Depending on the sort of information you require, the Internet may not always be the best way to find the information you require - or the quickest.

For instance, if you want information about 'drilling rigs' a search using one of the Internet search engines will net you about 4,000 leads mainly to information produced by organisations involved with such units. You then have the time-consuming necessity of visiting each page to find its relevance.

However, an expert searcher, such as those at the IP, can search for 'drilling rigs' on an on-line bibliographic database, such as Tulsa, and net you over 7,000 references to journal articles, conference papers and books about the topic. These can be whittled down by the addition of extra terms until a limited number of really pertinent references are left - all of which can be obtained for you in hard copy.

Members of library staff are always available to help and advise on your data search and to direct you to the most appropriate sources of information for your needs.

Contact the Information Department of the IP on +44 (0)171 467 7114/5, or e-mail lis@petroleum.co.uk for more details or to discuss your requirements.

...Standards

API E&P Summer Standardization Conference

The API E&P department held its summer session of Subcommittee and Task Group meetings during the week of 15-19 June in Dallas, Texas. There were also a number of ISO/TC 67 Working Group meetings held during the week including SC 3/WG 2 'Well cements' and SC 4/WG 6 'Subsea equipment'. TC 67 Advisory Group 3 had a full day meeting on Thursday 18th and Subcommittee 5 'Casing, tubing and drill pipe' held their annual meeting on Friday 19th. Holding such meetings in association with the API has helped to publicise that API standards can be effectively revised and published by TC 67. From the keynote address onwards the buzz word (well acronym) in the API Task Groups was ISO, and for the non-US experts present this was extremely encouraging. Many of the API experts are now actively participating within TC 67 working groups and want to move additional base documents into the international arena (for

example API 7L within SC 4/WG 1) and importantly, some of the API Task Groups and ISO Work Groups are working together without delineation on the one set of words for both API and ISO Standards. There is growing optimism that TC 67's vision of 'global standards used locally worldwide' will become reality.

At the meeting of TC 67/AG 3 there was recognition that substantial progress has been made by focusing extra attention on 27 key standards on the TC 67 Work Programme (the Focus List). Experience gained while expediting the publication of these documents is now being disseminated throughout the TC and this will ensure that the other standards on the programme also benefit. At least half of these key standards have now been sent to ISO Geneva to progress to the next stage of voting, and these and others are expected to be published in 1999 and 2000.

Functional Specifications

Two key documents have recently passed ballot through the ISO Central Secretariat in Geneva - ISO 13879 is a standard on how the user/purchaser should write of a Functional Specification and ISO 13880 is the companion document for the supplier to write a Technical Specification. Both documents will now go forward for voting as Final Draft International Standards (FDIS).

John Lambert of BP has been an active member of ISO/TC 67/WG2 which developed these standards as part of a suite of documents aimed at enabling conformity assessment when using Functional Specifications. The international discussions began at much the same time as the start of the CRINE initiative in the early 1990s and the ISO work embodies many of the CRINE principles. John Lambert is now preparing informative national annexes which will assist in the use of both standards when they are published in early 1999.

The intention is also to revise all the CRINE Functional Specifications to conform to ISO 13879 and to include specific reference to it. At a meeting in early July, it was agreed that the national annex wording should also be incorporated into each of the 29 functional specifications to encourage users/purchasers to follow them as a model or template when preparing their own tender documents. The CRINE Functional Specification Guidance Document will also be revised to include specific reference to the work done internationally and will now be set in the context of the entire procurement process. The ultimate aim is for the vendor to supply a fit-for-purpose product at reduced cost through the use of standard solutions.

The Institute is now responsible for distributing and maintaining the CRINE Functional Specifications. If you would like to become involved with helping revise these documents, please contact Sjoerd Schuyleman +44(0)171 467 7132.

Don't forget to take your standards with you

Before you zip up your suitcase and head off to the airport for your well earned summer holiday, check to make sure you have that all important poolside accessory - a draft standard. Reviewing one of TC 67's many drafts that are out for comment over the summer will greatly assist in our efforts to gain UK technical input to their content. The TC 67 standards also come in a handy fly-swatting

format and can be quite effectively used as sunhats in case of emergencies. Visit our website to find out which are currently available.

Our website can be found at:
www.petroleum.co.uk

The Institute of Petroleum is pleased to announce that the IP website has won the European Special Library Innovation Prize, awarded by the European Chapter of the Special Libraries Association and sponsored by Resources Exhibitions Ltd.

If you have not visited us yet please do so on

www.petroleum.co.uk



Special Libraries Association

The IP website - supplying a comprehensive range of oil and gas information to your desktop.

Fuel tank additive tackles valve seat recession

Leaded fuel is due to be phased out across Europe and will no longer generally be available on forecourts from 1 January 2000. A number of companies have been developing lead replacement fuels that aim to provide a similar octane rating and level of engine performance to leaded fuel while still protecting the engine from valve seat recession. RE Speciality Chemicals has chosen a different road, however, and is launching a lead replacement agent in the UK which is added to a vehicle's tank by the motorist when filling up with fuel. *Pascal Estienne, Sales and Marketing Manager, explains.*

Valve seat recession is a serious problem affecting the exhaust valves of older engines which are designed to run on leaded gasoline. Abnormal exhaust valve seat recession occurs when these vehicles are operated on unleaded fuel. This is because the lead which is added to gasoline to provide octane improvement also acts as a solid lubricant between the exhaust valve and the soft exhaust valve seat (which has a Brinell hardness value of less than 300), preventing the valve from recessing into the cylinder head.

Valve seat recession is a wear process taking place between the valve seat, valve face, the intermediate material between them and the surrounding medium. The interaction between the valve seat and its mating face in the presence of hot combustion gases gives rise to two important mechanisms for valve seat recession: adhesion and abrasion.

Adhesion is caused by the formation and separation of flakes of iron from the surface of the valve seat which is in contact with the exhaust valve. The material is transferred from the valve seat to the valve face in the form of ferrous oxides which are produced by a chemical reaction between the hot combustion gases and the metal surface. These oxides adhere and become embedded in the valve face to form a 'grinding wheel'-like surface.

Abrasion follows the adhesion. Once the material transfer during the adhesion process begins, the scrubbing and rotating of the valve face against its seat under high contact forces generates abrasive wear. The hard oxides on the valve surface act as a lapping compound against the valve seat. The speed of valve seat recession is increased at high rpm, making engines with even just a small degree of valve hardening susceptible to valve seat wear, especially if they

do a lot of motorway driving or towing. There are no valve seat recession problems if leaded gasoline is used. Lead in gasoline produces lead oxide, which protects the areas of valve seat from high temperature corrosion and subsequent formation of abrasive ferrous oxides and a solid 'lead layer' lubricant which reduces the abrasive wear.

However, in a bid to reduce harmful emissions to the atmosphere, leaded gasoline is being progressively phased out around the world to be replaced by non-lead types of fuel.

To date, two methods of preventing the valve seat recession resulting from the removal of lead from gasoline have been developed.

- The engine can be modified by using a harder valve seat material. Such modification has been implemented on most recent engine designs but is costly and impractical for classic engines.
- An anti-valve seat recession agent can be used as a lead replacement in unleaded gasoline. This can be pre-blended by the gasoline supplier (see box) or added directly to the fuel tank by the motorist. The agent permits the phasing out of leaded gasoline without any risk of extensive damage to engines designed with soft valve seats (ie all engines manufactured before 1981 and most produced until 1989).

Three types of anti-valve seat recession agent chemistries are currently available:

(i) *Phosphorous compounds* in the form of amine salts or mixed alkyl acid phosphate. However, studies have shown that while phosphorous functions as an anti-valve seat recession agent, it will poison exhaust catalysts. There is therefore a high risk of damage if the additive is added by mistake to a vehicle

fitted with a catalytic converter.

(ii) *Sodium based compounds* in the form of sodium petrosulfonates. Although such compounds function as an anti-valve seat recession agent, they have been linked to some cases of premature turbocharger failures in Sweden on Saabs and Volvos.

(iii) *Potassium based compounds* in the form of potassium petrosulfonates or Valve Guard (proprietary chemistry). The Valve Guard (V-Guard) chemistry is currently the preferred option throughout Europe because it avoids the problems resulting from water interaction with sulfonates. It is also said to be more cost effective to use because its molecular structure allows the amount of functional potassium present in the additive to be maximised.

Valve Guard has been in use in Austria and Scandinavia since 1992, in Argentina since 1995, and in Germany, the Czech Republic and France since 1996. It has demonstrated effective performance and shown no signs of any negative side-effect on either car or motorcycle engines. The tank additive is now available in one-litre dispenser bottles for direct use by owners of older or classic engines in the UK through RE Speciality Chemicals.

For more information contact RE Speciality Chemicals. Tel: +44 (0)161 776 0600 Fax: +44 (0)161 775 0264 or at www.reschem.com (click on V-Guard).

V-Guard is also marketed by Lang Chemie in Austria and neighbouring countries.

RE Speciality Chemicals thanks Austrian national oil company OMV for sharing its field experience of lead replacement additives which date from 1990.

UK latest position

In the UK the oil companies have not yet announced whether they will be supplying pre-blended lead replacement gasoline in their forecourts from 1 January 2000. Shell has indicated that this would be its preferred option (see *Petroleum Review*, November 1997).

British Standards issued a draft specification for lead replacement gasoline in May 1998 but this was withdrawn in the face of legal action. Further work is suspended pending the outcome of the legal process.

Making a move on critical valves

To enable plant operators to conveniently verify the functionality of critical emergency shut-down (ESD) valves without process interruption, Keystone has launched a new manual operability verification equipment (MOVE) device.

It has been designed in response to tightening statutory requirements for the frequent testing of ESD systems in petrochemical, offshore, process and chemical industries. 'It is vital to ensure that over time these valves have not seized in the open position and can in fact be fully closed in emergency situations,' states the company.

Said to eliminate the need for total or partial process shut-down – which can be costly in terms of downtime – MOVE allows the actuator to partially close the valve by only 20%, thus verifying operability without affecting process conditions.

To prevent unauthorised access, the device incorporates a proprietary interlocking device which can be easily integrated into 'permit to work' systems.

The device's modular construction also allows it to be simply retrofitted to any quarter-turn actuated valves, says



the company. The unit is manufactured from corrosion resistant carbon steel.

Tel: +44 (0)141 810 3121

Fax: +44 (0)141 810 4724

World first for flue gas measurement

Rosemount Analytical has introduced the Oxymitter 4000, an *in situ* zirconium oxide-based oxygen transmitter for flue gas measurements. Claimed to be the only unit of its kind currently available on the market, the unit has been approved to Cenelec and Canadian Standards Association (CSA) standards for use in hazardous area applications. It has also been granted a Cenelec Eex IIB T2 certificate by LCIE Protection/Environments, a French Cenelec certification testing agency.

The unit integrates an oxygen probe and field electronics into a single, compact

package. No sampling system is required as the probe inserts directly into a flue gas duct to measure oxygen in combustion processes. The transmitter housing mounts directly to the probe – such an integrated design minimises the installation costs of separate electronics, probe cable and conduit, according to the manufacturer.

Available in 18-inch as well as 3-, 6-, 9- and 12-foot models, the unit operates in temperatures up to 700°C.

Tel: +44 (0)1243 863121

Fax: +44 (0)1243 845280

Fighting tank fires

Large-scale tank fires present a huge challenge to fire fighters, oil companies and to the environment. For such large fire risks the costs of fire protection and prevention are high, and optimising cost effectiveness is an important and difficult task.

An improved understanding of the extinguishment mechanisms and limitations of fighting foams is essential to make such judgements. A new project – Foamspec (large-scale foam application modelling of foam spread and extinguishment) – was recently launched in a bid to improve current knowledge.

Supported by the EC Environment and Climate Programme, and carried out in Sweden, Italy and the UK, Foamspec will investigate large-scale fire extinction by foam. It will:

- study foam jets and foam flow with the latest digital imaging techniques;
- investigate the effects of thermal updraft on foam;
- measure the rheology, surface properties, fuel pick up and fuel tolerance of foam; and
- develop computer models for foam spread on fuel surfaces.

Foam flow tests including large fire tests – up to 150 m² – will be used to refine these models, allowing realistic assessment of large fire risks.

This project is scheduled to complete in 2001. The results will be published as reports, articles and a project video. They will also be presented at an international seminar.

For further information contact Henry Persson at SP, Swedish National Testing and Research Institute. Tel: +46 33 16 51 98, Fax: +46 33 41 77 59. Alternatively, view the project's web site at www.sp.se/fire/

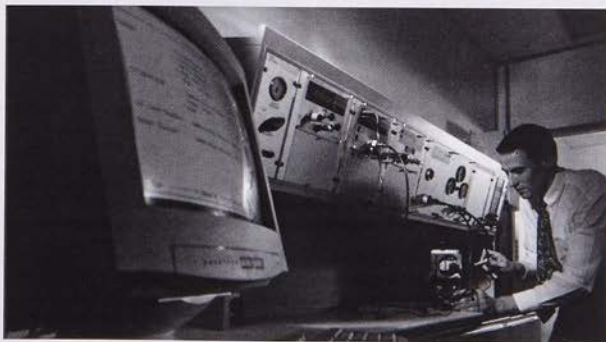
Traceable calibration

Endress + Hauser recently commissioned a new Manchester-based Calibration Laboratory for the calibration and repair of all industrial pressure, temperature and flow measurement equipment.

The in-house facility offers fully automatic calibration on any number of points across the operating range of such equipment. Test equipment operates in an environmentally controlled room and provides full traceability back to national quality standards, states the company.

Tel: +44 (0)161 286 5000

Fax: +44 (0)161 998 1841



Emergency storage shut-down system

Whessoe Vares has specifically tailored a safety valve shut-down system to the needs of a new A\$100mn LPG storage cavern under construction for Elgas at Port Botany in Australia. The system features dual hydraulically-operated valves which, in an emergency, shut down the casing end of the liquid phase piping.

The system has been designed to shut down on command from the plant's control/ESD (emergency shut-down) systems, or from a command via the manual control panel. It also features a further fail-safe mechanism - special plugs in the hydraulic lines will melt in the presence of a fire, releasing pressure which keeps the valves in their normally-open position.

The system protects seven gas

intake/outtake pipes using a HOSV system. Specially designed for this demanding application, the valves are optimised for reliability in the underground environment. Whessoe has also supplied a remote control panel for the system, providing local instrumentation and manual operational facilities, plus an interface to the plant's EDS system.

- The company recently published a guide to its portfolio of gauging instruments designed to offer optimised inventory management and control solutions for the terminals, tank farms and refineries.

Tel: +44 (0)1325 301100

Fax: +44 (0)1325 300840

Glycol recycling service for oil/gas producers



Teesside-based contract chemical processing and recovery company Chemox International has introduced a new glycol recycling service for oil and gas producers.

Specifically developed to address the safety, environmental and economic aspects of recycling glycol within the oil and gas industry, the service will handle tonnages as small as 20 tonnes to over

5,000 tonnes. The company is also able to upgrade glycol from gas hydrate suppression as well as pipeline swabbing to provide a cost-effective method of keeping glycol inventories and reprocessing costs to a minimum.

The company has ISO 9002 certification.

Tel: +44 (0)1642 248555

Fax: +44 (0)1642 250369

If you would like your new product releases to be considered for our Technology News pages, please send the relevant information and pictures to:

Kim Jackson

Deputy Editor, Petroleum Review

Dual action pilot valve



The Consolidated® MPV™ pilot valve for safety relief applications, recently unveiled by Dresser Valve & Controls Division, is claimed to be the first to combine both pop pilot (PV) and modulating pilot (MV) operations in a single design. The modular design of the new valve is also said to allow for easy field conversion from one configuration to the other.

The unit operates by sensing system pressure and using this pressure to control the closing force on the main (safety relief) valve disc. Increasing inlet valve pressure results in increasing closing force until the pilot valve opens. Pressure is relieved at a designated set point as process media is allowed to discharge through the main valve.

Use of the pop pilot configuration will result in a main valve disc 'pop' action from the seated position to 100% open. When the overpressure condition is relieved, the main valve disc will reseal under increased media pressure through the pilot valve to the main valve disc. In a modulating configuration, whereby a percentage of system pressure is held above the main valve disc by the addition of a modulator, the actual lift of the main valve disc is governed by the specific system overpressure instead of 'popping' instantaneously to an open position. This modulating action is said to improve operating efficiency through reduced media loss and lower emissions. It is also claimed to lower the pressure set point by 2-3%.

Tel: +44 (0)1695 52600

Fax: +44 (0)1695 720175

Membership News

NEW MEMBERS

Mr O Alao, Sherman & Hines Limited
Mr D R J Berry, Cameron McKenna
Mr N M Bore, Kenya
Mr E Coombs, Daiwa Europe Limited
Mr E M Cresswell, MacLean Cresswell Associates
Mr M J Davies, CSA Oil & Gas Services Limited
Mr J Dobson, F & B UK Limited
Mr M Dolan, IFE
Mr T Douek, Barnett
Mr R Ekong, Jueco Services
Mr G France, Avery Berkel Forecourt Services
Mr M H Frayne, East Horsley
Mr J M Gilligan, Basildon
Mr P Glasper, Oracle Corp (UK) Limited
Mr H W Goldsmith, Marlborough
Ms L Green, Glasgow
Mr P Hay, Oracle Corp (UK) Limited
Mr D J Hemmings, Arthur Andersen
Dr J I Hetherington, Cranfield University
Mr D J Hurlock, Thailand
Mr W M Keast-Butler, Marketline International Limited
Mr S King, Med-Lab Limited
Mr A Kingwell, Surbiton
Mr A M Lackie, Troon
Ms C Lowrie, BWS International
Mrs P A Meade, AEA Technology plc
Mr J H Nulty, Flangeftt Stainless Limited
Mr P P Patel, MAI Consultants Limited
Mr D Perkes, Fleetwood
Mr T G Ramakrishnan, Malaysia
Mrs H Saleh, BBC World Service
Mr P Sargeant, Commerzbank AG
Mr T Simmons, CSC Computer Sciences Limited
Mr M Smith, Rigel Petroleum UK Limited
Mr I Stanley, Australia
Mr Y S Tan, Sterling Impreglon Asia Pte Limited
Mr P P Tsui, Ying Wah Eng & Consult Limited
Mr M Valentine, Oracle Corp (UK) Limited
Mr A K Vickers, J&W Scientific
Mr N White, Nick White Independent Research
Mr P J Winward, THG International Publishing

NEW STUDENTS

Ms E Dantas, Hove
Mr K A Hidayatalla, Imperial College
Miss S Imura, Japan
Mr V Okouma M'Angha, London
Ms L M Southgate, Co Antrim

DEATHS

We have been notified, over the past few months, of the deaths of the following members:

	Born
Mr T A Carberry	1920
Mr W J F Cocks	1920
Mr P J F Horn	1924
Mr H L M Ross	1923
Mr P V Nair	1924
Mr H Tair-Meragheb	1941
Mr A C M Wilson	1925

NEW FELLOW

Mr V L Oliver FirstPet

Mr Oliver joined ITS Testing Services UK Limited in 1971. His responsibilities include customer care, quotation preparation for laboratories, liaison between laboratory inspection officers and clients. Mr Oliver is also responsible for progression of technical queries and contractual requirements on behalf of both laboratory and inspection based activities. Mr Oliver supports his local IP branch by encouraging staff members from ITS to attend the programme of events on a regular basis.

Obituary

Sir John Greenborough

We report with much regret the death at age 75 of 'John' Greenborough, a Fellow of the Institute of Petroleum and President from 1976 to 1978. Born in 1922, Hedley Bernard Greenborough joined the Asiatic Petroleum Company in 1939 but later became a pilot in the RAF and the First Air Arm as well as in the US Navy.

He rejoined Shell in 1946, serving in California, Brazil and Argentina. He was Area Coordinator, East and Australasia with Shell International from 1967 to 1968 and Managing Director (Marketing) Shell-Mex and BP Ltd from 1969 to 1971. With the termination of the Shell-Mex and BP partnership on 31 December 1975, John Greenborough, then Chief Executive and Managing Director, became Managing Director and Deputy Chairman of Shell UK Ltd with responsibilities covering exploration and production, oil supply, refining and marketing, and chemicals manufacture and marketing in the UK.

In May 1977, he became Deputy President of the Confederation of British Industry of British Industry and then President from January 1978 to 1980. The Royal Dutch/Shell Group made top level management changes in Shell UK in 1978 to allow him more time for his work as CBI President.

He was Chairman of the UK Oil Industry Emergency Committee from 1971, Chairman of UK Oil Pipelines, Chairman of the UK Petroleum Industry Advisory Committee and President of the National Society for Clean Air.

Greenborough was awarded a CBE in June 1975 and a KBE in 1979 as President of the CBI. On retiring from the CBI, he did not return to Shell but became Chairman of Newarthill, the McAlpine group holding company, and a Deputy Chairman of Bowater and Lloyds Bank. Among many other things, he chaired the pay review body for nursing and ancillary staff. He was a gifted raconteur.

He is survived by his wife Gerta and a stepson whom he brought up as his own.

Around the Branches

A full listing of Branch Events is available on the IP website:

www.petroleum.co.uk

or, if you require further information please contact your individual Branch Secretary.

EVENTS

Forthcoming

AUGUST

18-20 Cairns, Australia

Spillcon '98
Details: Julie Morrison, The Meeting Planners, Australia
Tel: +613 9819 3700

SEPTEMBER

7-8 London

North African Gas '98: Investments & Supplies
Details: SMI Ltd, UK
Tel: +44 (0)171 252 2222
Fax: +44 (0)171 252 2272

8-9 London

World Oil Prices
Details: Jenni Wilson, Centre for Global Energy Studies, UK
Tel: +44 (0) 171 235 4334
Fax: +44 (0) 171 235 4338
e-mail: jenni.wilson@cges.co.uk

9-10 Berlin

Energy Markets, What's New?
Details: Prof Dr Georg Erdmann
Fax: +49 30 3142 69 08

9-10 The Netherlands

Shared Services: Achieving Cost Effectiveness and Service Excellence in the Energy Industry
Details: IQPC Ltd, UK
Tel: +44 (0)171 430 7300
Fax: +44 (0)171 430 7303
e-mail: ssenergy@iqpc.co.uk

12-13 Singapore

8th Annual Pacific Petroleum Insiders Upstream
Details: Global Pacific & Partners (Pty) Ltd, US
Tel: +1 281 597 9578
Fax: +1 281 597 9589
e-mail: GLOPACAMER@aol.com

13-18 Houston

17th Congress of the World Energy Council
Details: Barry Haest, WEC Congress Exhibition Director, Management PennWell Conference & Exhibitions, US
Tel: +1 713 963 6238
Fax: +1 713 963 6284

13-18 Houston

Energy and Technology: Sustaining World Development into the Next Millennium
Call for Papers: Mr Richard H Williamson, Houston World Energy Congress Inc, US
Tel: +1 202 331 0415
Fax: +1 202 331 0418

14-15

Fuel Cell Technology
Details: IQPC Ltd, UK
Tel: +44 (0)171 430 7300
Fax: +44 (0)171 430 7301
e-mail: fuels@iqpc.co.uk

14-15

The Iranian Petroleum Summit
Details: Beth Scanlon, SMI Ltd, UK
Tel: +44 (0)171 252 2222
Fax: +44 (0)171 252 2272

14-16

Middle East Petrotech '98
Details: Arabian Exhibition Management WLL, Bahrain
Tel: +973 550033
Fax: +973 553288
e-mail: aeminfo@batelco.com.bh

14-16

Petroleum Economics
Details: IBC UK Conferences
Tel: +44 (0)171 453 5491
Fax: +44 (0)171 636 6858
e-mail: cust.serv@ibcuk.co.uk

14-18

LPG Supply, Economics, Markets and International Trading
Details: The College of Petroleum and Energy Studies, UK
Tel: +44 (0)1865 250521
Fax: +44 (0)1865 791474

17-18

Risk Analysis
Details: IBC UK Conferences
Tel: +44 (0)171 453 5491
Fax: +44 (0)171 636 6858
e-mail: cust.serv@ibcuk.co.uk

18-21

Understanding the Commercial, Economic and Trading Aspects of Oil Refining
Details: Petroleum Economist, UK
Tel: +44 (0)171 831 5588
Fax: +44 (0)171 831 4567/5313

19-20

Petroleum Trading and Cargo Shortages
Details: Mike England, Abacus International, UK
Tel: +44 (0) 1245 328340
Fax: +44 (0) 1245 323429

20-25

The Commercial and Political Challenges
Details: The Alphanat Partnership, UK
Tel: +44 (0)171 613 0087
Fax: +44 (0)171 613 0094

London

21-24

Commercial Issues in LPG Trading - Contracts, Shipping, Prices and Risk Management
Details: The College of Petroleum and Energy Studies, UK
Tel: +44 (0)1865 250521
Fax: +44 (0)1865 791474

21-25

UK Oil & Gas Law
Details: Ms Moira McKinlay, University of Dundee, Scotland, UK
Tel: +44 (0)1382 344303
Fax: +44 (0)1382 322578
e-mail: cplmp@dundee.ac.uk

23-24

Gasification - The Gateway to a Cleaner Future
Details: Tracy Lepkowska, IChemE, UK
Tel: +44 (0)1788 578214
Fax: +44 (0)1788 577182

23-25

Ports 98, Maritime Engineering and Ports
Details: Sally Radford, Wessex Institute of Technology, UK
Tel: +44 (0)1703 293223
Fax: +44 (0)1703 292853
e-mail: sradford@wessex.ac.uk

24-25

Petroleum Trading and Cargo Shortages
Details: Mike England, Abacus International, UK
Tel: +44 (0)1245 328340
Fax: +44 (0)1245 323429

27-30

SPE Annual Technical Conference and Exhibition
Details: Dan Lipsher, Society of Petroleum Engineers, US
Tel: +1 972 952 9306

The Annual Inter-Branch Golf Tournament

Thursday 6 August 1998
Crieff Golf Club

The tournament is for teams of six on a Stableford basis against full recognised club handicaps and all Branches and Individual Members are invited to participate.

For further information and entries contact:
W H Beaton, 63 Carlton Place, Glasgow, UK
Tel: +44 (0)141 418 0401

INSTITUTE Awards



The Chairman of IP ST, Chris Bartlett (left) presents Mike Sherratt with an IP Certificate of Appreciation award.

Mike graduated as an electrical engineer in 1968 and has since held a succession of senior engineering positions before moving on to become Director of Research and Development at Stanhope Seta Ltd in 1987.

He is currently a member of IP ST (Test Method Standardization Committee), ST-L (Test Methods Evaluation Sub-Committee) and the following IP Test Method panels: ST-B-4, ST-B-7, ST-B-8, ST-B-9, ST-C-2 and ST-C-4. He is also a regular member of the UK Delegation to ISO/TC 28 meetings and an active member of the ISO/TC 28-35 Joint Working Group for Flash Point Methods.

Mike has done much to further the development of standard test methods, particularly those which use automated and automatic techniques for the testing of petroleum and petroleum products.



The Chairman of IP ST-E, Dr Bryan Hayton (left) presents Mr Harry Bentley with an IP Certificate of Appreciation award.

Harry started work with Esso in 1946 and was appointed Technical Manager in 1973, a position he held until his retirement in 1985.

He joined the IP Bitumen Test Sub-committee ST-E in 1958, serving as Deputy Chairman from 1975 to 1979. After his retirement from Esso Harry retained an active interest in the bitumen industry and continued to attend and participate in Panel and Sub-committee meetings at his own expense until he retired as a member in 1997. During his time with ST-E and its panels he has made a major contribution to Bitumen Test Method Standardization.

The West of Scotland Branch Annual Golf Championship

Thursday 10 September 1998
Ralston Golf Club, Paisley

For further information and entries contact:
W H Beaton, 63 Carlton Place, Glasgow, Tel: +44 (0)141 418 0401



Bob Hooks, Chairman of the IP's Test Methods Standardization Analysis Committee (left), presents Philip Shore of Lubrizol with the IP's Certificate of Appreciation for his work as Chairman of the ST-G 10 Automotive Emissions Steering Group.



Bob Hooks (left) presents Diane Hall of BP Oil Technology with the IP's Certificate of Appreciation for her work as Secretary of the ST-G 10 Automotive Emissions Steering Group and its Organic and Inorganic Analysis Sub-groups.

The above Working Groups have been instrumental in producing the first standard test methods for the analysis of diesel particulates. The working groups are truly international in membership and comprise representatives from all the European major engine and vehicle manufacturers, oil companies and test houses specialising in auto-emission analysis.



David Brown, Chairman of the IP Environment Committee (right), presents Mark Beaumont (formerly of BP) with the IP's Certificate of Appreciation for the work undertaken for the Environment Committee and its Working Groups.

IP Conferences and Exhibitions

International Conference on

Aviation 2000 – Safety and Operations

London: 1–2 October 1998

organised in association with the American Petroleum Institute

This is the third in the series of IP Aviation Conferences and Exhibitions organised by the Institute of Petroleum (IP) and the American Petroleum Institute (API). This year's Conference and Exhibition will address the increasing emphasis on ramp safety within the aviation industry, both in terms of fuelling questions and other ramp users. The new developments in filtration and related test procedures will also be discussed and linked with the broader issue of fuel quality impacts on jet engine performance.

Speakers include: **James E Swartz** (Director – Corporate Safety, Delta Air Lines), **Franz Frank** (Airbus Industrie), **Allan Edwards** (Shell Aviation Ltd), **Edward Matulevicius** (Exxon Research & Eng Co), **Albert Bates** (Air BP Ltd), **Stuart Bullock** (Rolls Royce Aerospace Group), **Gregory K Tuchy** (The ServiceMaster Company), **Duncan Eggar** (Air BP Ltd) and **Vic Hughes** (Shell Research & Technology Centre).

Exhibition

A major Exhibition of equipment linked with aviation fuelling will also be held in association with the Conference. Companies interested in exhibiting should contact Pauline Ashby for further information.

The programme and registration form is now available.

International Conference on

Recommissioning? Removing, Re-using or Recycling Redundant Offshore Facilities

The Netherlands: 14–15 October 1998

Organised in association with the Netherlands Energy Research Foundation (ECN) and the IP Netherlands Branch, this international Conference will address the four 'R's of decommissioning steel offshore platforms. Presentations will focus on actual examples of achievements to date.

Speakers include: **Oystein Mundeheim** (Esso Norge) and **Henk van Elck** (Hoogovens Klöckner Scrap Metals) who will share their experiences of the disposal of the Odin platform and **Tom Neal** who will present the European Commission's views of the way forward. This two-day event will include an evening reception, dinner and two optional site tours.

Who should attend:

Managers and engineers from the operators and contractors as well as those involved with regulatory and environmental issues.

The programme and registration form is now available.

Recruitment

Kvaerner Oil & Gas Ltd

Kvaerner Oil & Gas Ltd has an enviable reputation for practical innovation – and provides a comprehensive range of services to the Oil & Gas industry. We are also part of the international Kvaerner Group – one of the world's foremost engineering companies.

Operations Support is an important and growing part of our business, with contracts typically from £5m to £25m per annum.

Contract Managers

(On & Off-shore Operation Support)

Working closely with a Director, you will directly manage these long-term contracts to ensure we meet tough business and service performance targets.

It's a broad role, including sourcing and managing staff across on-shore and offshore sites, in areas including operations, maintenance, safety and managed services. You'll also manage engineering and construction services to deliver operational modifications and enhancements.

As one of our Contract Managers, you will be an example to your team in the delivery of best in class customer services levels – through solid performance, innovative action and continuous improvement.

Specifically, you will bring experience of managing engineering, construction, maintenance or business services within oil and gas or petrochemicals. A background in leading teams of more than 20 people is also essential, as is a track record of accountability in cost, profit and cash management.

In return we offer a package to match your experience, and all the career development you would expect from a leading international company.

Please apply in writing only, quoting reference SP/033 – including your cv and details of your current salary. Write to the Human Resources Co-ordinator, Kvaerner Oil & Gas Ltd, Howe Moss Avenue, Kirkhill Industrial Estate, Dyce, Aberdeen AB21 0GP.

KVÆRNER™

IP Conferences and Exhibitions

International Conference on

The Future Role of Oil Companies in the Changing Energy Jigsaw

London: 20 October 1998

The oil industry is in a state of flux. The traditional vertical linkage in the oil business – upstream, refining, marketing – is being undermined, while a new vertical linkage in the gas chain is being created – production, transportation, distribution, power generation. Is there a reason for this other than corporate fashion? Should all corporations react in the same way, or should strategies differentiate?

The programme and registration form will be available at the end of August.

Conference on

Microbially Enhanced Oil Recovery

London: 4 November 1998

This Conference will present the various issues associated with this technology. Speakers will present data of specific products – both whole cells and enzymes, means of testing their performance, and the view of the oil industry. The aim will be to assess the current and likely future role of MEOR in North Sea oil production.

The Programme and registration form is now available.

International Conference on

The Future of Transportation Fuel Quality in Europe

London: 12–13 November 1998

organised in association with AFTP and DGMK

Autumn Luncheon

London: 30 November 1998

Guest of Honour and Principal Speaker:

His Excellency Sheikh Ahmed Zaki Yamani

Former Minister of Petroleum and Mineral Resources for Saudi Arabia, 1962–1986.

The IP is launching an Autumn Luncheon this November which, it is hoped, will become an established date in the oil and gas calendar of events.

The ticket application form is now available

For programmes and registration forms please write or fax: Pauline Ashby, Conference Administrator, Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR, UK Tel: +44 (0)171 467 7100 Fax: +44 (0)171 255 1472 e-mail: pashby@petroleum.co.uk



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In return for your expertise, we are offering a competitive salary, contributory pension, medical insurance, stock option programme and other benefits. Interested? Then look us up on the Internet, web page <http://www.aspentech.com> and send your CV to:

Miss Cheryl Beavis
AspenTech Limited
Sheraton House, Castle Park
Cambridge, CB3 0AX

The closing date for receipt of all applications is Friday 28th August 1998.

MOVES

People

Peter Kallos, presently Enterprise Oil's Business Development Manager, is to become Chief Executive of Enterprise Oil Italiana SpA from 1 August 1998. Kallos joined Enterprise in 1988 where he has been a key player in the development of the Nelson oil field. He will take over from **Simon Oddie** who is to attend Harvard Business School's Advanced Management Course before returning to London in a senior role.

Frank Beer has been appointed to the position of HSE Manager of Chemwax Systems Ltd. Beer will assume overall responsibility for liaising with clients, to ensure they are kept up-to-date with changes in health, safety and environmental legislation and the consequent implications to the operations of their businesses.

Les Thomas has been appointed to the position of General Manager, Marathon Oil UK, based in the company's Aberdeen office. He succeeds **Mike Mueller** who has been appointed Manager, Deepwater Development based in Houston.



Measurement Technology Ltd has appointed **Simon McEntee** as Key Account Manager for customers in Scotland. He takes over the role from **Brian Watson** who has been promoted to the post of International Area Sales Manager for several northern European and African countries.

The Expro Group has made two new executive appointments. **Mark Docherty** will become Business Development Manager for Ecotec and will be instrumental in the management of the Group's environmental solutions for hydrocarbon recovery. **Tom Leeson** becomes Group Marketing Manager for Subsea, responsible for driving product development forward in line with industry requirements.

Oryx Energy has named **William H Kaufman** as Vice-President, Eurasian Operations and Managing Director, Oryx UK based in Aberdeen. Kaufman replaces **Patricia Horsfall** who has been named Vice-President, Business Development, Services and International Production, based in Dallas, Texas.

Bruce Watson has been named President of Global Marine International Drilling Corporation. In this role, Watson will be responsible for all of Global Marine's international operations. He was previously in charge of new construction for Global Marine Drilling Company based in Houston. In addition, **Gary Kott**, who has been instrumental in organising Global Marine International Drilling Corporation has chosen to take early retirement.

The Society of Exploration Geophysicists has announced the nominations for President-Elect. They are as follows: **William Barkhouse**, Mobil Exploration and Production Company; **Hugh Hardy**, Interpretation Consultants; **Ian Jack**, British Petroleum; and **Oz Yilmaz**, Paradigm Geophysical Company. Other nominees for the 1998-99 Executive Committee are: **John Castegna**, University of Oklahoma and **Steve Danbom**, Conoco for First Vice-President; **Orlando Chacin**, Intevap and **Samir A Moaty**, Amoco for Second Vice-President; **Wayne Pennington**, Michigan Technological University and **Joel Watkins**, Texas A&M University for Vice-President; and **Angela Stracner**, Mobil Oil and **John Sumner**, Exxon Production Research Company for Secretary-Treasurer. The

winners of this year's election will be announced in August after a vote by SEG's 14,000 members.

Phil Nolan, Managing Director of BG plc's pipeline business, Transco, has been appointed Executive Director of the company, with effect from 1 July 1998. He will continue to have responsibility for Transco.

The New York Mercantile Exchange has promoted **Debbie Bonsignore** to Senior Vice-President of Information Services; **Melba Cubillos** to Vice-President of Application Development; and **Richard Daniele** to Vice-President of Operations and Network Services.

Ramsay Spence has been appointed Non-Executive Chairman and **George Kynoch** Non-Executive Director of the Progenitive Services Ltd Group, of which NatWest Equity Partners completed an investment buy-out in March. Spence was formerly a Board Director of The John Wood Group until his retirement in 1996. Kynoch was formerly Minister for Industry and Local Government and Parliamentary Under Secretary of State for Scotland.

John Burt, Managing Director of Hertel Services, was elected as ECIA President at its May Annual General Meeting. Burt was elected Vice-President of the Association in May 1997 and has served on the Council of the Association since it was formed by merger in April 1994.

Steve Theede, Managing Director and Chief Executive Officer of Conoco Ltd will become responsible for the company's US onshore exploration and production activities, located in Midland, Texas. **Rick Hamm** will take over from him and will be based in Warwick.

Ian Peel has been appointed Worldwide Product Marketing Manager for the Ingersoll Pump Group of Ingersoll-Dresser Pumps. Peel will continue to be based at the company's facility at Newark and report to **Brian Squires**, Vice-President and General Manager of the Newark operation.



David Auty has joined AMEC Process and Energy as Director of Engineering. Auty joins the company from the Kvaerner Group, where he was most recently Director of Engineering for the London office. He has previously worked with Esso Engineering and in the power industry. **Chris Lumley** has also recently joined the company as Head of Health, Safety, Environment and Quality Assurance. This new role has been created within the company to further enhance the management of these key aspects of the business.

RSK Environment Ltd has announced the recruitment of four new consultants to its Aberdeen-based upstream oil and gas group. **Tony Regnier**, Principal Consultant and **Ian Stewart**, Senior Consultant, both join RSK from AEA Technology and bring significant experience in the areas of environmental assessment, environmental risk assessment, auditing and environmental management systems. **Sophie Tibble**, Senior Consultant, joins from Dames & Moore and ERM working on international environmental assessment projects for the oil and gas sector. The appointment of **Chris McMullon** completes the team.